ORDER

6780.8

DISTANCE MEASURING EQUIPMENT (DME)
INSTALLATION STANDARDS HANDBOOK
TYPE FA-9783

6/3/82

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Distribution: Selected Airway Facilities Field Offices; A-X(AF)-3; ZAF-601

Initiated By: AAF-410

RECORD OF CHANGES

DIRECTIVE NO. 6780.8

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE

FOREWORD

This order sets forth in one document the technical guidance for installing the distance measuring equipment (DME) and its associated equipment, the radio link status indicator (RLSI) and the remote alarm tone receiver (RATR), at air navigation facilities. It provides the floor plan drawings for locating the DME and its antenna mast at each type of facility, a step-by-step procedure for installing the equipment, and applicable interface and interconnection wiring diagrams.

The Chief, Navaids/Communications Engineering Division, AAF-400, is authorized to issue changes to this document; however, the authority to approve changes in policy is reserved for the Director, Airway Facilities Service, AAF-1.

GERALD L. THOMPSON
Director, Airway Facilities Service

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CHAPTER 1. GENERAL INFORMATION

1. PURPOSE. This order is a guide for planning and installing distance measuring equipment (DME) with remote maintenance monitoring, type FA-9783, its antenna, and associated remote alarm tone receiver (RATR) and radio link status indicator (RLSI) at air navigation facilities.

2. DISTRIBUTION. This order is distributed to selected offices and services within Washington headquarters, the FAA Technical Center, and the Aeronautical Center; to branch levels within regional Airway Facilities divisions; and to Airway Facilities field offices having DME type FA-9783 at air navigation facilities.

3. BACKGROUND. The DME provides the distance from the aircraft to the DME transmitter. The type FA-9783 DME is a completely solid-state unit that will be used to establish new collocated DME facilities and replace the obsolete vacuum-tube DME units currently installed at air navigation facilities. Cost studies have shown that replacing obsolete vacuum-tube equipment with solid-state equipment will pay for itself by savings in operating and maintenance costs. The FAA has planned a DME replacement program starting in fiscal year 1980 and extending for about 5 years. This order will provide DME installation direction to cognizant FAA and assigned contractor personnel.

4. SCOPE. This order provides direction for installing the DME, its antenna, the RATR, and the RLSI at existing air navigation facilities. The text provides a brief description of the equipment's functional and physical characteristics, presents floor plan arrangement drawings for locating the DME and its antenna mast at each facility type, defines a step-by-step procedure for installing the equipment, presents applicable interface and interconnection wiring diagrams, and contains initial checkout procedures for the DME and associated equipment.

a. This order provides installation guidance, direction, and checkout procedures for the DME with remote maintenance monitoring and associated equipment at existing air navigation facilities. Once DME equipment is installed and checkout is complete, the applicable manufacturer-furnished instruction books (as referenced) shall furnish all additional procedures for equipment operation and calibration.

b. Many of the facilities are not constructed exactly as shown, and some local adaptation may be required. Authorized deviation from standards may be obtained by filing FAA Form 6000-3, Airway Facilities Criteria Waiver Request.

5. SAFETY. Personnel shall at all times exercise care while working on equipment where dangerously high voltages are employed. This is especially true when inspection plates and dust covers are removed or access doors are opened, exposing internal wiring. Contact with alternating current (ac), direct current (dc), or radio frequency (rf)

potentials can result in severe shock, burns, or death. Maintenance personnel should familiarize themselves with the resuscitation technique found in the first aid manual. All individuals should be thoroughly familiar with general safety practices before working on equipment so they do not endanger themselves or others. Operating and maintenance personnel should refer to the latest editions of Orders 6000.15, General Maintenance Handbook for Airway Facilities, and 3900.6, Occupational Safety Program for Airway Facilities Personnel, for safety precautions to be observed. Ignorance and carelessness are predominant factors in most accidents. Particular attention shall be given to the proper use of the grounding rods before working on high-voltage circuits. Under certain conditions, dangerous potentials may exist in circuits with power controls in the OFF position because of charges retained in capacitors. To avoid injuries, always remove power, then discharge and ground using a grounding rod before touching any parts.

6. DIRECTIVE VERBS. This order contains policy statements and other guidance material wherein directive verbs such as SHALL, WILL, and MAY are used. The following rules of usage apply:

a. Shall is used to denote compulsory or mandatory action that the person directed is obliged to take. Example: The equipment SHALL be adjusted to operate in accordance with handbook tolerances.

b. Should is used to denote an action that is strongly recommended, but left to the discretion of the person being directed. Example: The equipment SHOULD be shut down if, in the opinion of the technician, catastrophic failure is imminent.

c. Will is used to denote action in the future tense. Example: Obsolete equipment WILL be replaced as soon as funds can be made available.

d. May is used to denote permission. Example: At navigational aid (navaid) facilities, certain maintenance activities MAY be performed without recourse to flight inspection.

7. FAA DRAWINGS. The drawings included in this order as standard references are listed in table 1-1.

8. COMMISSIONING DATA. After the facility is commissioned, a complete FAA Form 198, Facility Equipment Performance and Adjustment Data, for the DME, the RATR, and the RLSI will be prepared jointly by the installation personnel and the sector manager or his representative. Samples of these forms are presented in the appendixes to this document. FAA Form 198's shall be completed prior to flight check and commissioning.

9. ABBREVIATIONS. Definitions of abbreviations, acronyms, and initialisms are located in chapter 7 of this document.

TABLE 1-1. FAA DRAWINGS

TABLE 1-1. FAA DRAWINGS (continued)

Drawing	Title	Page No.
D-6204-014	FA-9783 DME Installation DME/ILS Floor Plan	57
D-6204-015	FA-9783 DME Installation DME/ILS Floor Plan 87" x 184" Enclosure	59
D-6204-016	FA-9783 DME Installation AN/GRN-27 Electrical Equipment Shelter	61
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D-6204-021	FA-9783 DME Installation DME/VOR Floor Plan 10' x 24' Trailer	71

10. WAIVERS. Facility configuration must be standardized to allow future standard enhancements for all facilities. The instructions, descriptions, standards, drawings, and procedures contained in this directive represent the FAA's baseline and standard criteria concerning type FA-9783 DME equipment. Some facilities under the purview of this directive have been commissioned before the effective date of this order using equipment which has been procured without the benefit of FAA-approved specifications. Existing DME facilities which are not in compliance with this order on the effective date of this order shall be considered nonstandard facilities. Adherence to the standard at these existing very high frequency omnidirectional radio range (VOR) sites is delayed until the second-generation equipment is installed. The second-generation installation will adhere to the standard.

a. Regional procurement of equipment and devices to be used for air traffic control or navigation for which specifications have not received prior FAA approval is prohibited by the latest edition of Order 1100.5, FAA Organization - Field, paragraph 222j(2). The inclusion of such nonstandard equipment in this directive is for installation purposes only and, as such, will not be used as justification for procurement, installation, or commissioning of additional or similar equipment. Those facilities having a need to use nonstandard procedures for DME installation will request waivers to applicable paragraphs of this directive in order to continue to operate with justifiable variances. For explicit instructions pertaining to commissioning, operating, and maintaining nonstandard facilities, see the latest edition of Order 6000.20, Waiver of Criteria for Establishment and Maintenance of Airway Facilities. Requests for waivers submitted by facilities management personnel will be accompanied by all pertinent technical data necessary to define the problem and to justify the nonstandard equipment or operation requested. They will also include recommended solutions to the problem. Waivers already approved are still valid and do not require resubmission.

b. At existing facilities that are operationally acceptable, no wiring changes are to be made solely as a result of receiving this order. Existing waivers shall remain in effect as long as these facilities are considered operationally acceptable; however, whenever a facility undergoes modification such as modernization, conversion, relocation, or equipment addition and removal, the standards set forth herein shall be followed.

c. Action shall be taken to budget for facility improvements which eliminate the need for waivers. Nonstandard facilities shall be upgraded to standard facilities within 5 years of the effective date of this order. The 5-year time frame allows for the normal budgeting process. The regions have the responsibility to submit budgetary estmates to effect the upgrading of nonstandard facilities.

11. FLIGHT CHECKS. It is the responsibility of the installation team to make all preparations for the commissioning flight check. The facility should be stabilized for at least 24 hours before flight check time, and all unsatisfactory conditions should be corrected. The flight check shall be accomplished in accordance with the latest edition of OA P 8200.1, United States Standard Flight Inspection Manual (see appendix 1).

CHAPTER 2. DME EQUIPMENT DESCRIPTION

12. INTRODUCTION. The following paragraphs provide a general functional and physical description for the DME with remote maintenance monitoring, its antenna mast, and associated equipment. A block diagram of the DME equipment with remote maintenance monitoring is presented in figure 2-1.

13. DME FUNCTION. The DME with remote maintenance monitoring is a completely solid-state system that provides all the requirements of a DME ground station transponder for electronic aeronautical navigation. Future remote maintenance monitoring equipment will provide remote control and status indication of DME equipment and environment.

a. The DME is designed to reply to interrogations from aircraft using an airborne interrogator that has performance equal to or better than the requirements specified by the International Civil Aviation Organization (ICAO) Standard Annex 10. The DME receives aircraft interrogation pulse pairs, decodes them, and encodes a new pulse pair that is transmitted to the aircraft with a fixed transponder system time delay. In addition, the DME transponder transmits identification pulse pairs in response to a Morse code keyer and transmits randomly timed pulse pairs sufficient to maintain equipment duty cycle. These random pulses are known as squitter. Minimum transmitter output power is 100 watts (W) modularly expandable to 1000 W. The RATR was designed to interface with the existing navaid monitor panel.

b. Interconnection with future remote maintenance monitoring equipment will provide remote control and status indication of the operational characteristics of DME equipment and environment that can be controlled from the keyboard on the DME monitor and control assembly. Remote maintenance monitoring equipment will interface with the DME monitor and control assembly through an EIA-RS-232C interface. Onsite programmable test equipment will interface with the DME monitor and control assembly through an IEEE-STD-488 interface. This configuration will allow a technician to control and test DME functions from a remote input/output terminal (i/ot). A block diagram of the remote maintenance monitoring equipment configuration is included in figure 2-1.

14. DME PHYSICAL DESCRIPTION. The DME consists of an equipment rack (unit 1) and an omnidirectional antenna (unit 2). The equipment rack contains a test assembly, a transponder (two transponders in the dual version), a monitor and control assembly with a keyboard and alphanumeric light-emitting diode (LED) display, and a power supply. These components are slide mounted in a 76-inch equipment rack, with the monitor and control assembly mounted so that its keyboard is at a convenient height for a seated operator. A convenience outlet is provided at the bottom front of the equipment rack. The rack configuration is shown in figure 2-2.

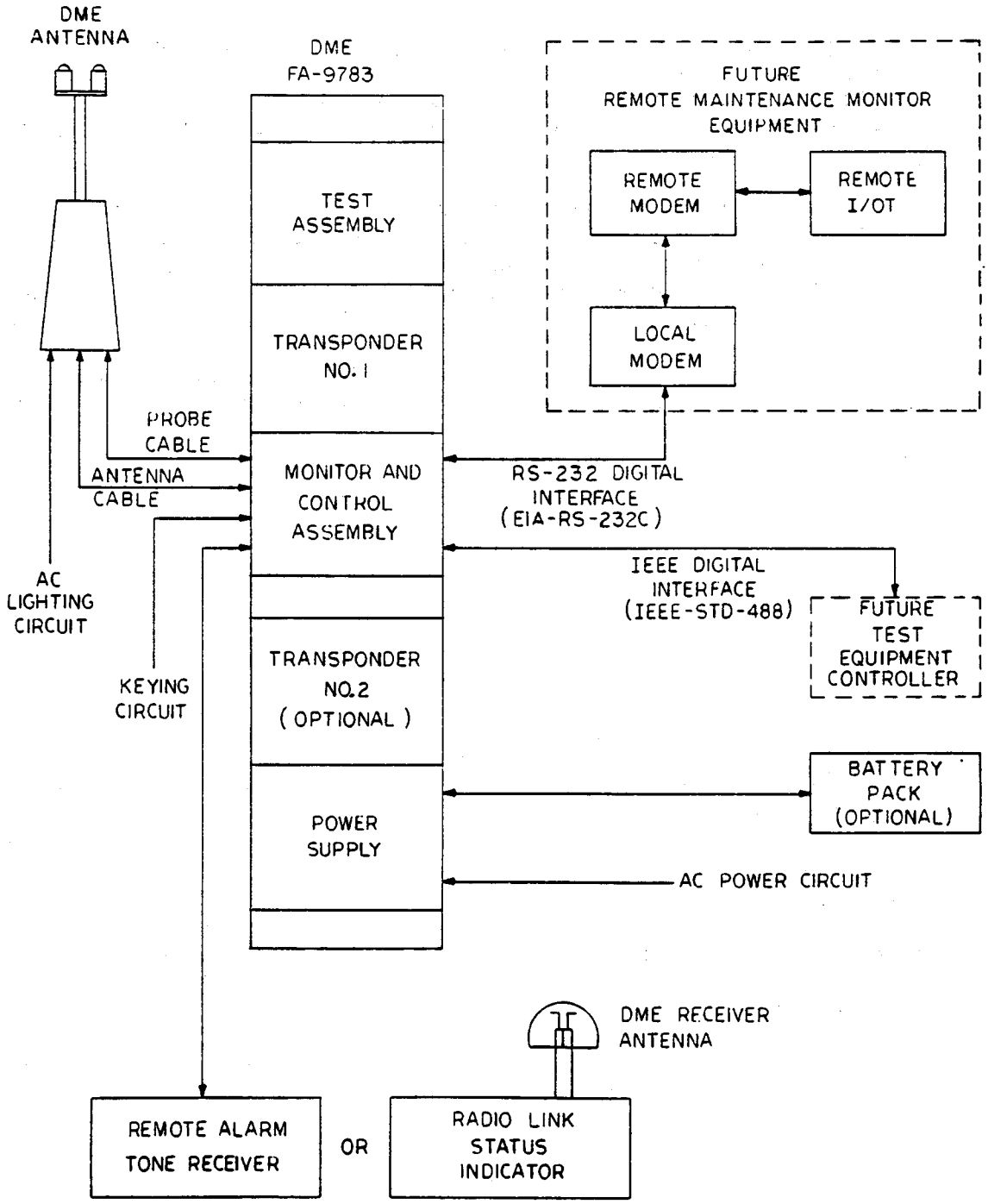


FIGURE 2-1. DME (FA-9783) BLOCK DIAGRAM

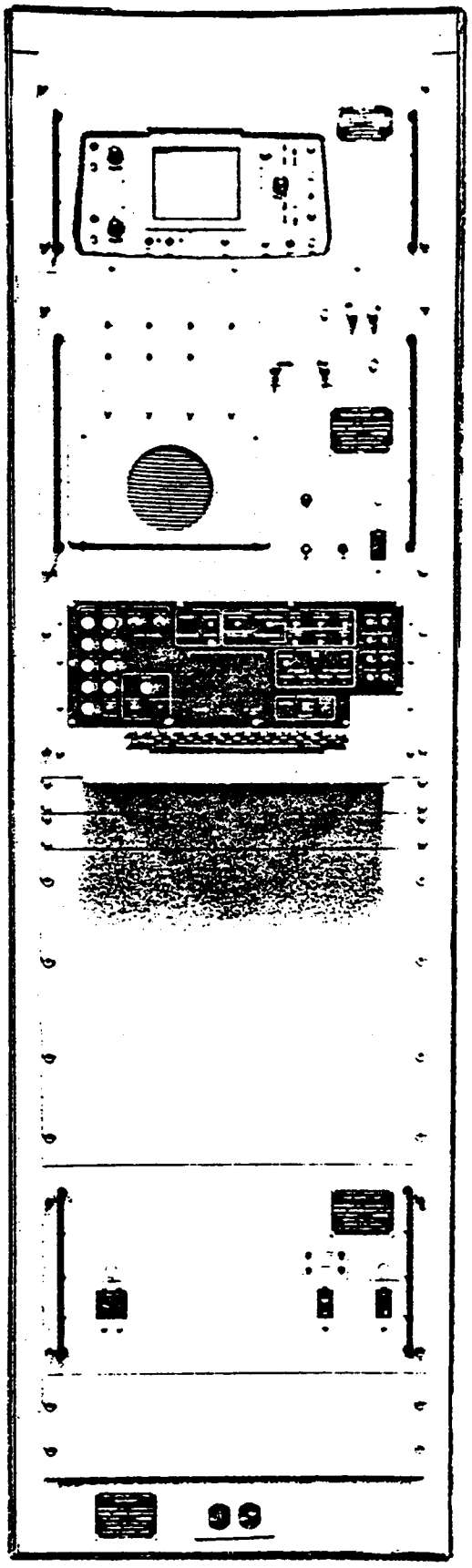


FIGURE 2-2. DME EQUIPMENT RACK CONFIGURATION

a. Unit 1 assemblies fit into the equipment cabinet rack on stainless steel, fully retractable slides mounted on the sides of the main frame. This enables each assembly to be completely withdrawn from the equipment rack or placed in a three-quarter lock position for servicing. All unit interconnections are accomplished at the rear panels and are readily accessible through the front upon extension of the chassis to the lock position. If desired, accessibility to the rear interior of the equipment cabinet is provided via a removable rear panel.

b. External connections are accomplished through the use of three terminal blocks mounted on the interior right-hand side (as viewed from the back) of the equipment cabinet. The upper terminal board is used for connections to the very high frequency (vhf) facility, the middle one is for ac power to the cabinet, and the bottom one is for interface connections to the battery. Antenna and monitor probe cables are connected to their respective jacks at the top of the equipment rack.

15. BATTERY PACK FUNCTION. A battery pack designed to provide power to DME equipment during outages of primary ac power may be supplied at selected air navigation facilities. The battery pack shall provide 25-volt (V) dc, 50 ampere hours for at least 4 hours at -10 to +50 degrees Celsius (^{o}C) for lead calcium batteries and -40 to +50^{o}C for nickel cadmium batteries. The battery pack shall complete a charge cycle (50 percent of full charge to full charge) in a maximum of 12 hours at -10 to +50^{o}C for lead calcium batteries and -40 to +50^{o}C for nickel cadmium batteries when charged by the DME power supply. In normal operation, the battery pack will be charged from the DME power supply. A block diagram of the interconnection between the DME power supply and the battery pack is included in figure 2-1; a schematic diagram of this interconnection is presented in drawing D-6204-019.

16. BATTERY PACK PHYSICAL DESCRIPTION. (To be supplied.) See figure 2-3.

17. RATR FUNCTION. The RATR receives two different tone inputs from the DME via a telephone line or equivalent circuit. It detects and distinguishes between the 2820- and 2940-hertz (Hz) tones from the remotely located DME and indicates DME transmitter status on front panel lamps with provisions for indication on external lamps. External indication signals are provided from a barrier-type terminal board in the rear of the equipment. Receipt of a continuous 2820-Hz tone lights a white indicator marked NORMAL 1. Similarly, receipt of a continuous 2940-Hz tone lights a white indicator marked NORMAL 2. A block diagram of the RATR is presented in figure 2-4.

(To Be Supplied)

FIGURE 2-3. DME BATTERY PACK

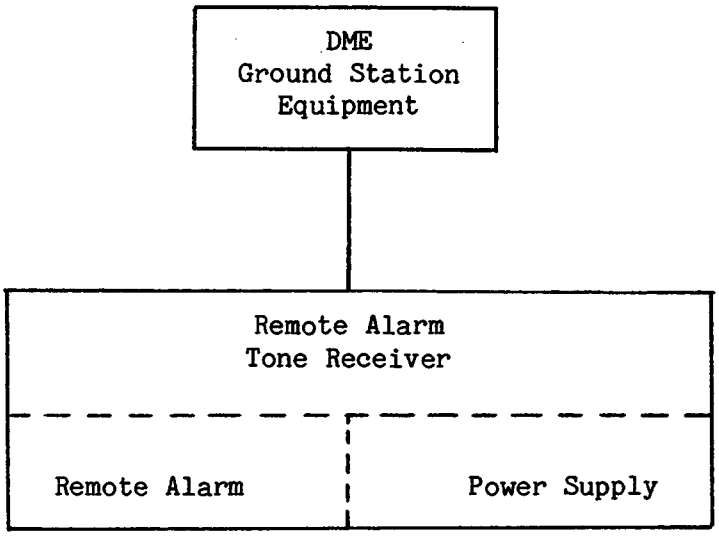


FIGURE 2-4. RATR BLOCK DIAGRAM

18. RATR PHYSICAL DESCRIPTION. The RATR (figure 2-5) can be installed into a standard 19-inch equipment rack and, if necessary, can also be operated when located on any flat surface such as a mounting shelf or a workbench. The regions have the responsibility of installing the RATR.

a. Mounted on the front panel are two indicator lamps and a toggle switch for control of ac primary power to the power supply assembly. Mounted on the back of the hinged front access door, which is opened by means of two quarter-turn fasteners, is the remote alarm printed circuit board (pcb). Interconnection of the board with the other circuits of the RATR is accomplished via a miniature multipin connector. With the hinged door open, equipment components and the bottom of the power supply assembly are accessible. The three control relays for lamp operation are all mounted on a relay bracket secured to the bottom interior of the enclosure, directly behind the access door. Interconnection of the power supply assembly with the other circuits of the RATR is also accomplished via a miniature multipin connector.

b. Mounted on the outside of the rear panel is a male power receptacle and a barrier-type terminal board. The male power receptacle is used for connection, via externally supplied cabling, to the source line voltage (nominal 120 V). The terminal board is used for connection, via externally supplied telephone lines and twisted wire cabling, of the tone inputs and of those external lamps used for remote duplication of the front panel indicators. A clear plastic strip mounted above the barrier terminal board serves as a protective cover and carries the following information: CAUTION 115 V ac.

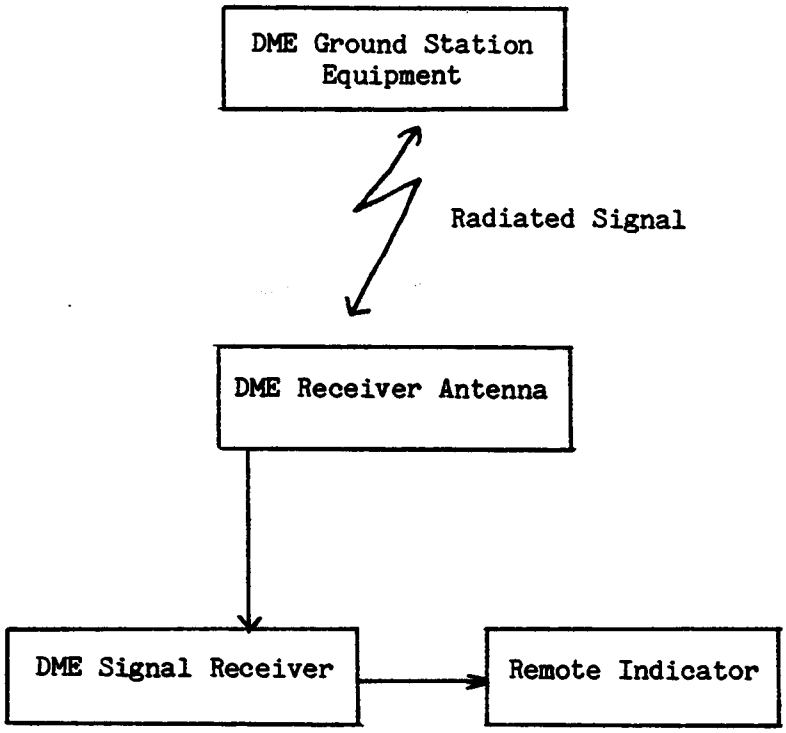
19. RLSI FUNCTION. A block diagram of the RLSI is presented in figure 2-6. The RLSI continuously monitors the presence of the radiated signal from the DME and also monitors the periodically keyed DME identification signal. Range is limited to line-of-sight (los). Visual and aural alarms are provided when the radiated signal is entirely absent (shutdown condition). Remote and local indication of these alarms are provided by the RLSI equipment.

20. RLSI PHYSICAL DESCRIPTION. The RLSI consists of three separate units: a DME signal receiver (unit 4), a remote indicator (unit 5), and a DME receiver antenna (unit 6). The interrelationship among these units is shown in figure 2-6.

a. The DME signal receiver (unit 4, figure 2-7) consists of a chassis with front panel attached and a 7-inch-high aluminum drawer-type enclosure case as housing for the chassis. The case (open at the rear) contains fully retractable slides that permit the unit 4 chassis to be pulled out to a service position. The case has mounting flanges that permit the DME signal receiver to be mounted into a standard 19-inch equipment rack/cabinet.

(To Be Supplied)

FIGURE 2-5. RATR



Note: Range is limited to los.

FIGURE 2-6. RLSI BLOCK DIAGRAM

(To Be Supplied)

FIGURE 2-7. DME RLSI RECEIVER

b. The remote indicator (unit 5, figure 2-8) is housed in a metal enclosure 6.25 inches high by 6 inches wide by 5.5 inches deep. Unit 5 can be mounted in a rectangular cutout in an operating console or placed on a level surface. The bottom of unit 5 has four removable rubber feet to facilitate tabletop mounting.

c. The remote indicator (unit 5) front panel contains indicator lamps that duplicate the normal and shutdown status indicator lamps on the DME signal receiver unit. The malfunction capability is not used. Thus, remote indication of the transmitter status is provided by unit 5 at the same time that the indication is provided locally by the DME signal receiver unit. The remote indicator front panel also has an aural alarm (sounding when a shutdown exists), a silence pushbutton switch that deactivates the active alarm, and a volume control that permits the sound level of the alarm to be reduced or increased.

d. The remote indicator (unit 5) does not contain any electronic control circuitry. The front panel has eight mounting holes through the front flange to allow for console mounting, if required. At the rear of unit 5 is a panel on which is mounted the multipin connector J1 that permits interconnection to DME signal receiver (unit 4). Access to the unit 5 front-panel components is available when the rear panel is removed.

e. The DME receiver antenna (unit 6, figure 2-9) is a vertically polarized, half-wave dipole (refer to table 5-3). A radome is provided for protection and monitoring integrity under ice and snow conditions. Mounting of the antenna requires an los to the DME. The antenna is constructed of aluminum alloy, with provision for mounting atop a 1.5-inch pipe or to the side of a structure. Antenna dimensions including radome are: 12 inches high by 12 inches wide by 8.5 inches deep.

21. DME ANTENNA FUNCTION. The omnidirectional antenna is shown in figure 2-10. Each element consists of four dipoles spaced equidistantly on a fixed radius. The use of four dipoles for each element results in a horizontal pattern with a ratio of maximum gain to minimum gain of less than 2 decibels (dB). The vertical pattern is tilted slightly from the horizon and has a specific gain rolloff below the horizon. The pattern is obtained by arraying seven collinear dipoles and controlling their amplitude and phase excitation to produce the desired asymmetrical pattern. The vertical stack consists of seven sets of elements.

22. DME ANTENNA PHYSICAL DESCRIPTION. The omnidirectional DME antenna (figure 2-10) consists of the antenna proper, a fiberglass radome (8.75-inch outside diameter), obstruction lights, base adaptor for installation

(To Be Supplied)

FIGURE 2-8. DME RLSI REMOTE INDICATOR

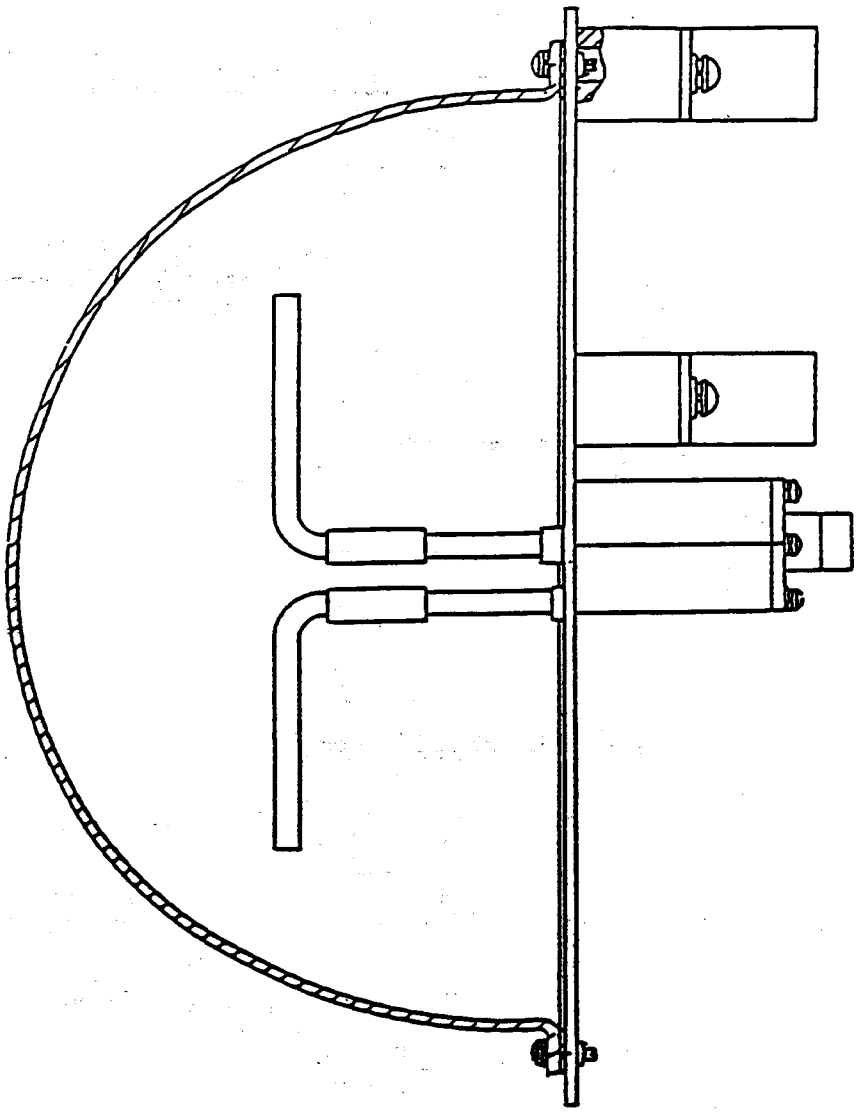


FIGURE 2-9. DME RLSI ANTENNA

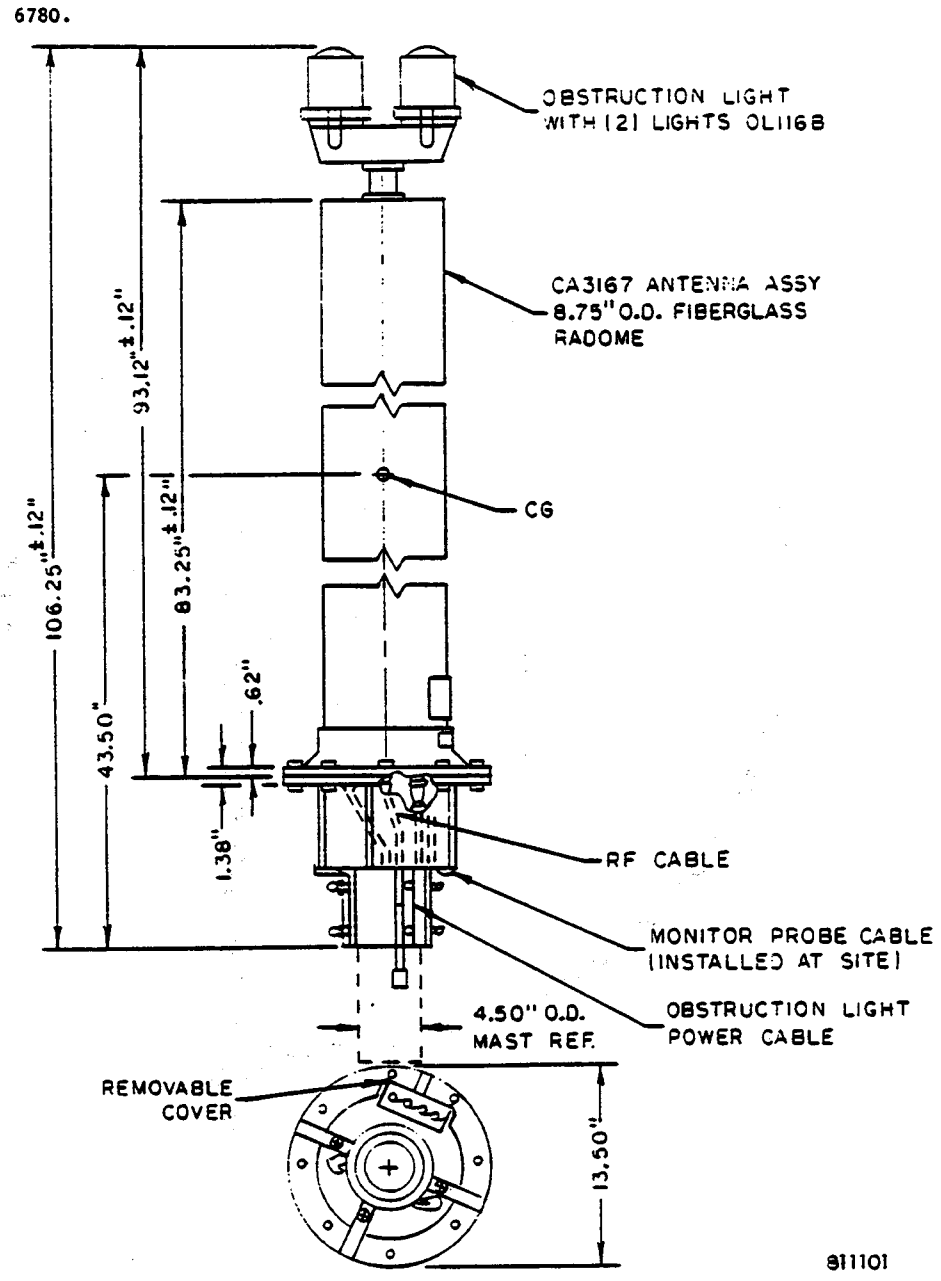


FIGURE 2-10. DME ANTENNA

on a standard 4-inch pipe (nominal outside diameter of 4.5 inches), a removable captive cover plate for unobstructed access to all connectors, two monitor probes, and connectors for the coaxial cables and obstruction light power. The cabling between the antenna and the DME rack is not furnished with the DME set (neither coaxial cables nor power cable). RG-214/U shall be used throughout for standard installation of rf transmission cable, monitor antenna cable, and antenna cable because of the short run, frequency requirements, and flexibility requirements. Continuous runs shall be used wherever possible. The type N rf connectors furnished to accommodate type RG-218/U cable to the main transmission line shall not be used. The type N connectors supplied for use with the RG-214/U cable for the monitor probe transmission lines shall also mate with the connectors installed on the antenna. A connector is provided to connect the ac power cable to the obstruction light power connector (type connector is in accordance with the latest edition of specification FAA-G-2100, Basic Requirements for All Equipment). The obstruction light fixture has dual lamps with red cover 120 V ac, 1250-lumen incandescent. The obstruction light shall be used where required.

23. RESERVED.

CHAPTER 3. DME INSTALLATION DRAWING PACKAGE

24. INTRODUCTION. The installation drawings listed in table 1-1 and described herein shall be adhered to when locating the DME rack and its antenna, locating the battery pack at applicable sites, completing applicable interface wiring connections, and routing cable or conduit.

25. DRAWING SYNOPSIS.

a. Drawings D-6204-001 through D-6204-006 present VOR air navigation facility floor plan arrangements. The DME rack is located adjacent to an existing VOR rack, and the DME antenna is located on the facility roof at the antenna access point. The existing 4- by 4-inch square duct, shown on the drawings, shall be used for routing power cable from the ac power distribution panel and the battery pack (where applicable) to the DME and the ac power distribution channel antenna obstruction lights, and shall also be used for routing the antenna signal cable to the antenna access point.

b. Drawings D-6204-007 and D-6204-008 depict the existing facility Wilcox or 16-foot cone modified to accept the DME antenna.

c. Drawing D-6204-009 shows the DME/VOR interface connections. Note 1 of the drawing references the required changes to remote control units for this installation.

d. Drawing D-6204-010 is the wiring diagram for connecting the DME terminal boards to the DME antenna, the ac power distribution panel, and other DME equipment. The drawing is applicable at both DME/VOR and DME/instrument landing system (ILS) installations.

e. Drawing D-6204-011 presents the antenna cable installation for DME/ILS enclosures. The drawing shows the approved method of wall penetration and coupling hardware, cable routing from the enclosure to the antenna mast, and cable banding to the antenna mast.

f. Drawings D-6204-012, D-6078-3, and D-6078-4 provide details for the hinged mast assembly.

g. Drawings D-6204-013 through D-6204-016 present DME/ILS enclosure floor plans for locating the DME rack and the battery pack (where applicable) within the enclosure, positioning dimensions for locating the DME antenna external to the enclosure, and conduit routing for the DME and its antenna cables. At the DME/ILS enclosures, the DME rack is adjacent to the existing ILS rack or is freestanding. Where the DME is freestanding, dimensions are shown on the drawing for locating the DME.

h. Drawing D-6204-017 presents the keying interface connections for the Mark I series DME/ILS facilities.

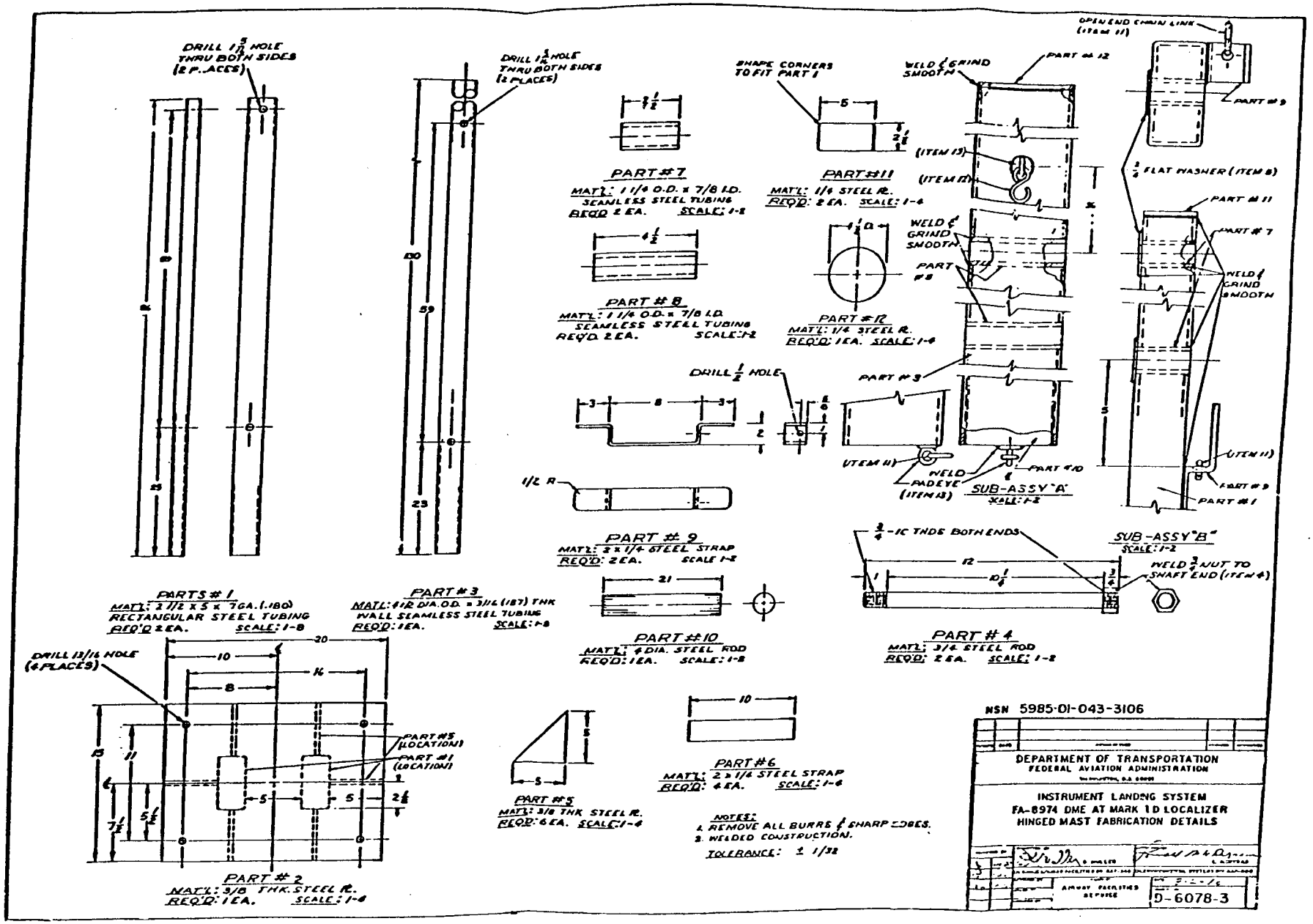
i. Drawing D-6204-018 presents the RATR and RLSI interconnection diagrams. The RATR or RLSI is remotely located at the air traffic facility in the maintenance electronic equipment room. The RLSI DME signal receiver antenna must be located within 25 miles in a direct los from the DME antenna.

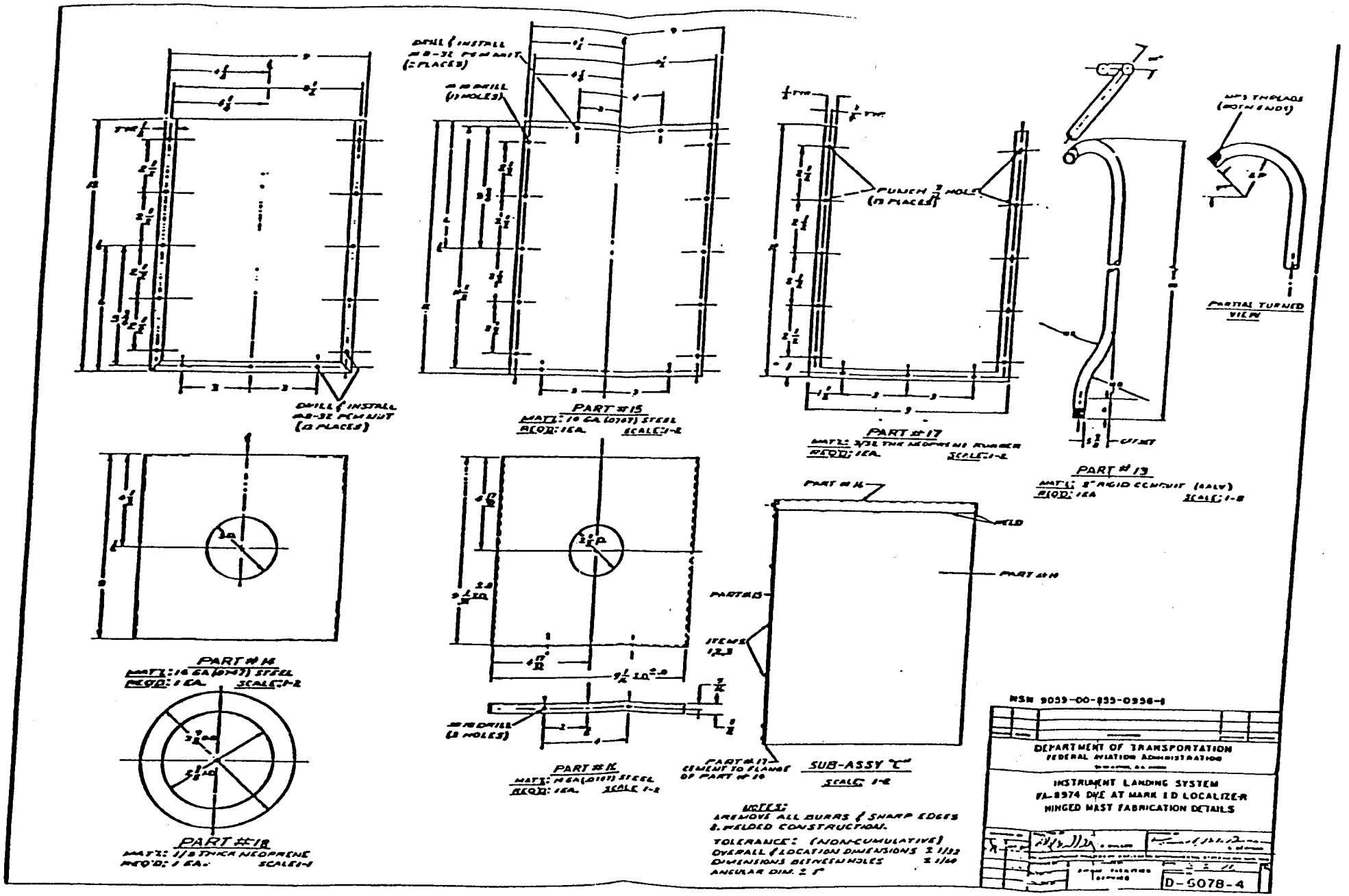
j. Drawing D-6204-019 presents connection diagrams for the DME battery pack to be installed at selected air navigation facilities sites.

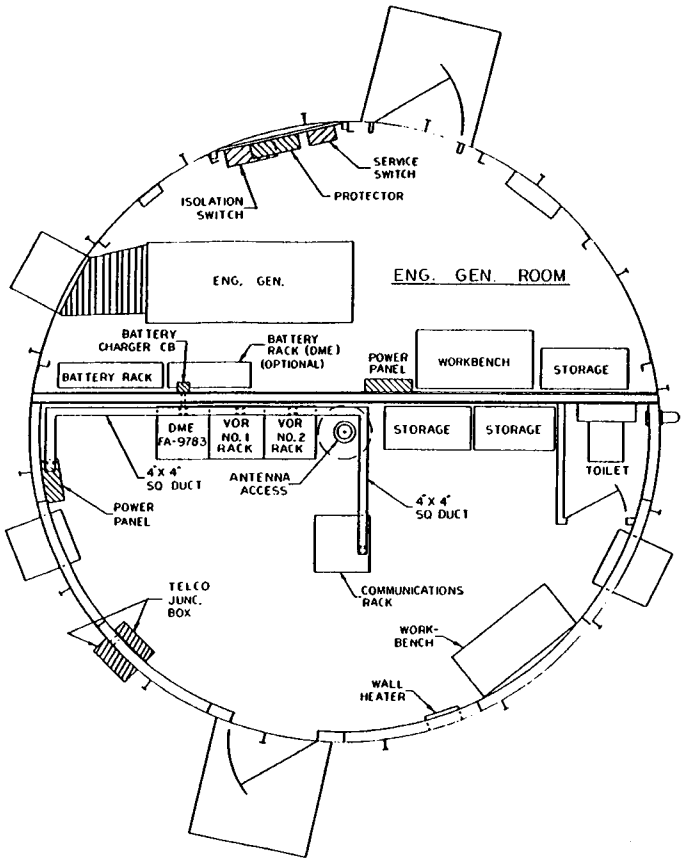
k. Drawing D-6204-020 presents a 20- by 36-foot type S building floor plan with three variations (details A, B, and C).

l. Drawing D-6204-021 presents the floor plan for a 10- by 24-foot trailer.

26.-27. RESERVED.


DRILL 1 5/16 HOLE THRU BOTH SIDES (2 PLACES)
DRILL 1/2 HOLE THRU BOTH SIDES (2 PLACES)
PART #1
MAT'L: 2 1/2 x 5 x 7GA. (.180) RECTANGULAR STEEL TUBING
REQ'D 2 EA. SCALE: 1-8
PART #3
MAT'L: 4 DIA. O.D. x 3/16 (.187) THK WALL SEAMLESS STEEL TUBING
REQ'D: 1 EA. SCALE: 1-8
DRILL 13/16 HOLE (4 PLACES)
PART #5 (LOCATION)
PART #1 (LOCATION)
PART #2
MAT'L: 3/8 THK. STEEL PL.
REQ'D: 1 EA. SCALE: 1-4
PART #7
MAT'L: 1 1/4 O.D. x 7/8 I.D. SEAMLESS STEEL TUBING
REQD 2 EA. SCALE: 1-2
PART #8
MAT'L: 1 1/4 O.D. x 7/8 I.D. SEAMLESS STEEL TUBING
REQ'D 2 EA. SCALE: 1-2
PART #9
MAT'L: 2 x 1/4 STEEL STRAP
REQ'D: 2 EA. SCALE 1-2
PART #10
MAT'L: 4 DIA. STEEL ROD
REQD: 1 EA. SCALE: 1-8
PART #5
MAT'L: 3/8 THK STEEL PL.
REQD: 6 EA. SCALE: 1-4
PART #6
MAT'L: 2 x 1/4 STEEL STRAP
REQD: 4 EA. SCALE: 1-4
NOTES:
1. REMOVE ALL BURRS & SHARP EDGES.
2. WELDED CONSTRUCTION.
TOLERANCE: ± 1/32
SHAPE CORNERS TO FIT PART 1
PART #11
MAT'L: 1/4 STEEL PL.
REQD: 2 EA. SCALE: 1-4
PART #12
MAT'L: 1/4 STEEL PL.
REQ'D: 1 EA. SCALE: 1-4
WELD & GRIND SMOOTH
PART #3
DRILL 1/2 HOLE
ITEM 11
WELD PADEYE (ITEM 13)
PART #10
SUB-ASSY "A"
SCALE: 1-2
OPEN END CHAIN LINK (ITEM 11)
PART #12
PART #9
1/4 FLAT WASHER (ITEM 8)
PART #11
PART #7
WELD & GRIND SMOOTH
PART #8
PART #1
3/4-IC THDS BOTH ENDS
SUB-ASSY "B"
SCALE: 1-2
WELD 3/4 NUT TO SHAFT END (ITEM 4)
PART #4
MAT'L: 3/4 STEEL ROD
REQD: 2 EA. SCALE: 1-2
NSN 5985-01-043-3106
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
INSTRUMENT LANDING SYSTEM
FA-8974 DME AT MARK 1D LOCALIZER
HINGED MAST FABRICATION DETAILS
ARMY FACILITIES DEPOSE
D-6078-3


DRILL & INSTALL #8-32 PEM NUT (2 PLACES)
DRILL & INSTALL #8-32 PEM NUT (2 PLACES)
#8 DRILL (2 HOLES)
PART # 15
MAT'L: 10 GA (0.135") STEEL
REQ'D: 1 EA.
SCALE: 1-2
PUNCH 3/8" HOLE (2 PLACES)
PART # 17
MAT'L: 3/32 THK NEOPRENE RUBBER
REQ'D: 1 EA.
SCALE: 1-2
WELD THIS PLANE (BOTH ENDS)
PARTIAL TURNED VIEW
PART # 13
MAT'L: 2" RIGID CONDUIT (GALV)
REQ'D: 1 EA
SCALE: 1-8
PART # 16
MAT'L: 16 GA (0.063") STEEL
REQ'D: 1 EA.
SCALE: 1-2
PART # 18
MAT'L: 1/8 THICK NEOPRENE
REQ'D: 1 EA.
SCALE: 1-1
PART # K
MAT'L: 16GA (0.063") STEEL
REQ'D: 1 EA.
SCALE 1-2
#8 DRILL (2 HOLES)
PART # 16
WELD
PART # N
PART # B
ITEMS 1, 2, 3
PART # 17 CEMENT TO FLANGE OF PART # 16
SUB-ASSY "C"
SCALE: 1-2
NOTES:
1. REMOVE ALL BURRS & SHARP EDGES
2. WELDED CONSTRUCTION.
TOLERANCE: (NON-CUMULATIVE)
OVERALL & LOCATION DIMENSIONS ± 1/32
DIMENSIONS BETWEEN HOLES ± 1/64
ANGULAR DIM. ± 1°
NSN 9059-00-853-0956-I
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
INSTRUMENT LANDING SYSTEM
FA-8974 D/E AT MARK I-D LOCALIZER
HINGED MAST FABRICATION DETAILS
D-5078-4



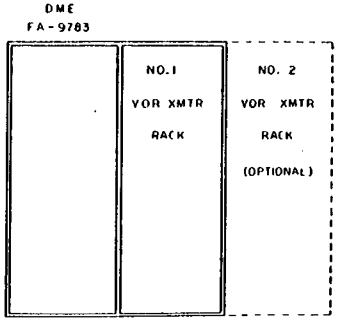
FLOOR PLAN

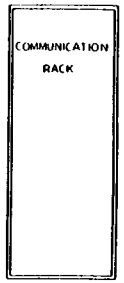
WIRING PANEL SCHEDULE - POWER DISTRIBUTION

1-PHASE 3 WIRE 120/240 VOLTS 225AMP MAINS SURFACE MTD

CIR CUIT	FOR	BREAKER POLES	TRIP	FRAME	VOLT	CIR CUIT	FOR	BREAKER POLES	TRIP	FRAME	VOLT
1						2					
3						4	OBSTRUCTION LIGHTS	1	15	100	120
5						6					
7	DME FA-9783	1	50	100	120	8					
9						10					
11						12					
13						14					
15						16					
17						18					
19						20					
21						22					
23						24					
25						26					

NOTE OBSTRUCTION LIGHTS TO BE INSTALLED ONLY WHERE REQUIRED





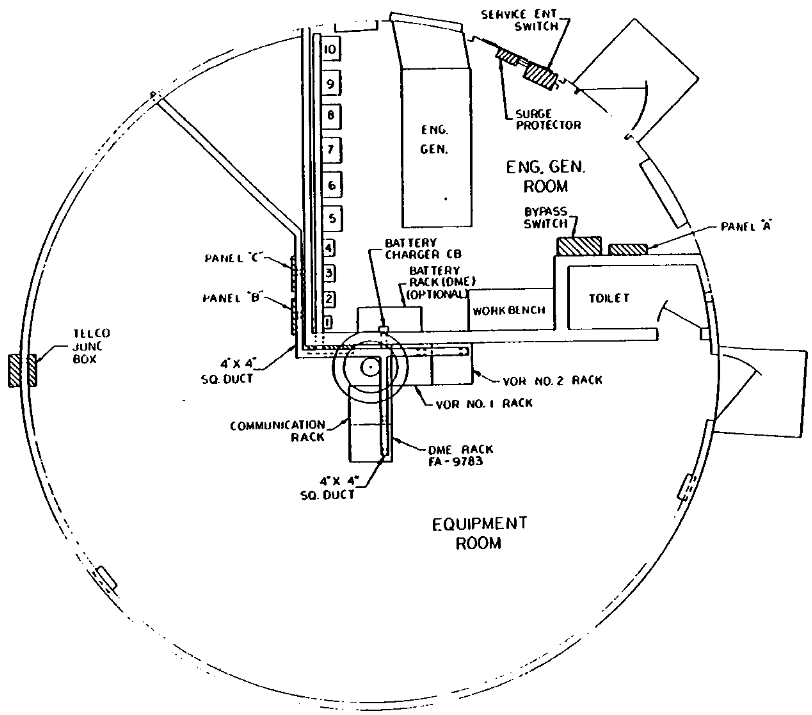
AMAF IND INC

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

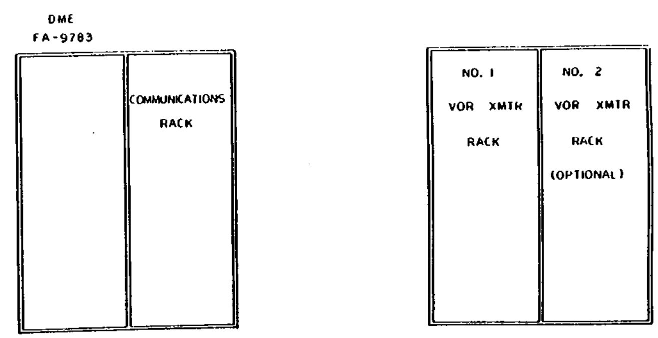
FA-9783 DME INSTALLATION
DME / VOR FLOOR PLAN
21' DIA SHELTER

AIRWAY FACILITIES SERVICE

D-6204-001



FLOOR PLAN



WIRING PANEL SCHEDULE - POWER DISTRIBUTION

3-PHASE 4 WIRE 120/240 VOLTS 225AMP MAINS SURFACE MTD

CIRCUIT	FOR	BREAKER POLES	BREAKER TRIP	BREAKER FRAME	BREAKER VOLT	CIRCUIT	FOR	BREAKER POLES	BREAKER TRIP	BREAKER FRAME	BREAKER VOLT
1						2					
3						4	OBSTRUCTION LT	1	15	100	120
5						6					
7	DME FA-9783	1	50	100	120	8					
9						10					
11						12					
13						14					
15						16					
17						18					
19						20					
21						22					
23						24					
25						26					

NOTE: OBSTRUCTION LIGHTS TO BE INSTALLED ONLY WHERE REQUIRED

REV LTR	DATE	DESCRIPTION	CHECKED	APPROVED

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

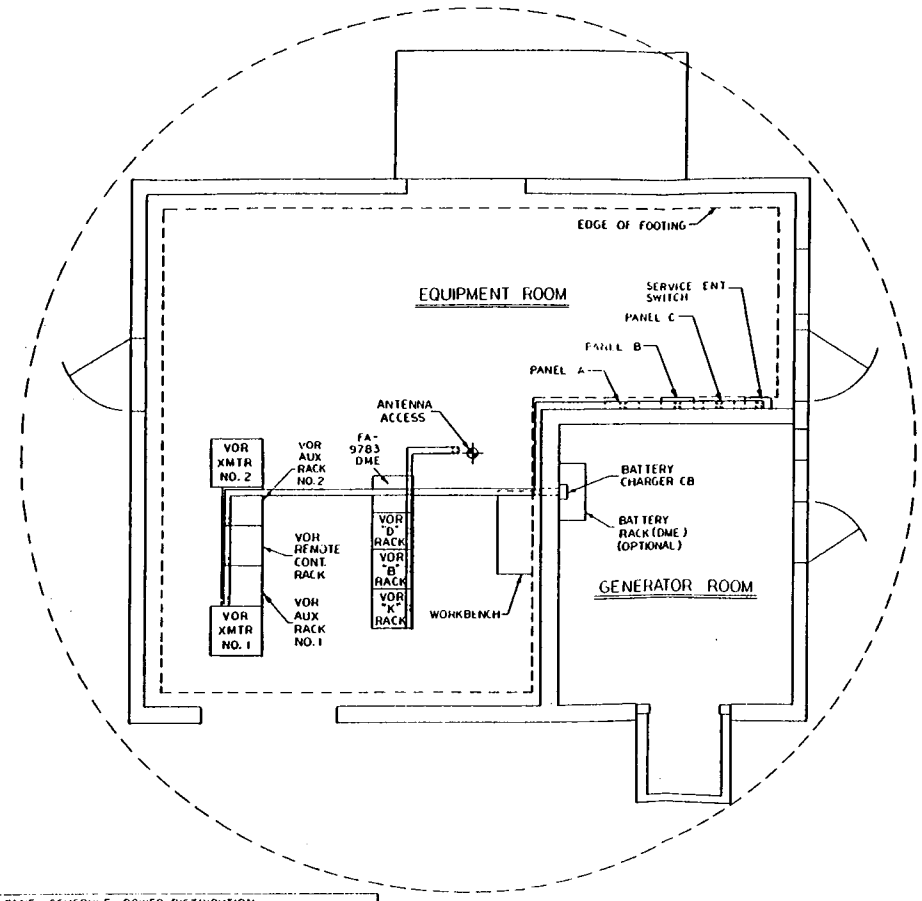
FA-9783 DME INSTALLATION
DME/VOR FLOOR PLAN
32' DIA. SHELTER

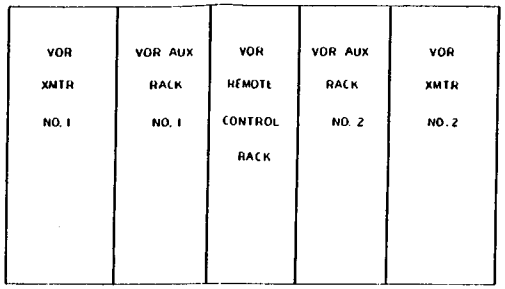
AIRWAY FACILITIES SERVICE

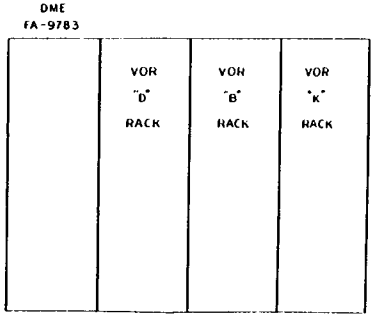
DATE: 6-25-82

D-6204-002

AMAF IND. INC.







WIRING PANEL SCHEDULE - POWER DISTRIBUTION

1-PHASE 3 WIRE 120/240 VOLTS 225AMP MAINS SURFACE MTD

CKT	FOR	BREAKER POLES	BREAKER TIMES	BREAKER AMPS	BREAKER VOLT	CKT	FOR	BREAKER POLES	BREAKER TIMES	BREAKER AMPS	BREAKER VOLT
1						2					
3						4	OBSTRUCTION LIGHTS	1	15	100	120
5						6					
7	DME FA-9783	1	50	100	120	8					

NOTE: OBSTRUCTION LIGHTS TO BE INSTALLED ONLY WHERE REQUIRED

AMAF IND. INC.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9783 DME INSTALLATION

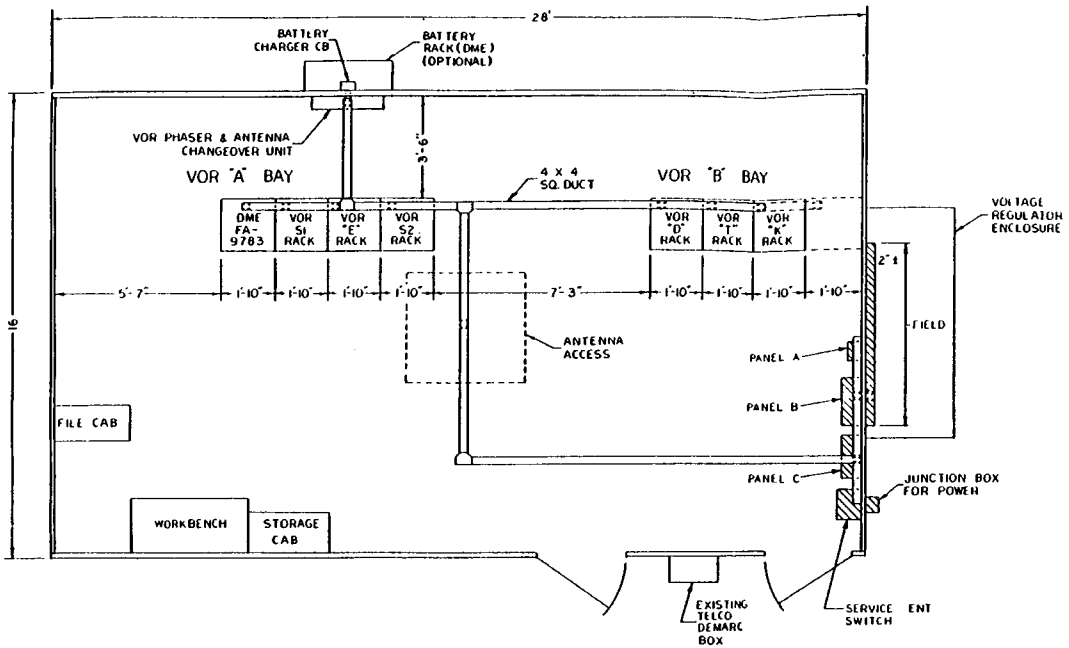
DME/VOR FLOOR PLAN

25' X 31' BUILDING

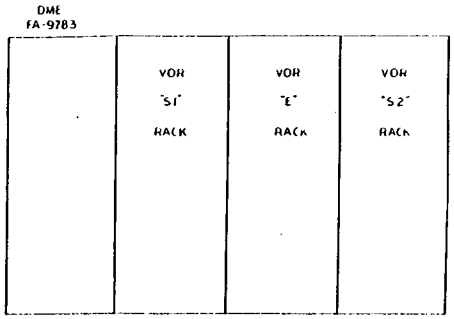
AIRWAY FACILITIES SERVICE

DATE 6-25-81

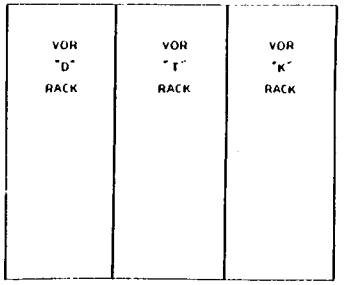
D-6204-003



FLOOR PLAN



VOR "A" BAY



VOR "B" BAY

NOTE: ALL DIMENSIONS ARE APPROXIMATE

WIRING PANEL SCHEDULE - POWER DISTRIBUTION

1 PHASE 3 WIRE 120/240 VOLTS							225 AMP MAINS SERFACE MTD					
CIR-CUIT	FOR	BREAKER POLES	TRIP	FRAME	VOLT	CIR-CUIT	FOR	BREAKER POLES	TRIP	FRAME	VOLT
1						2					
3						4	OBSTRUCTION LIGHT	1	15	100	120
5						6					
7	DME FA-9783	1	50	100	120	8					
9						10					
11						12					
13						14					
15						16					
17						18					
19						20					
21						22					
23						24					
25						26					

NOTE OBSTRUCTION LIGHTS TO BE INSTALLED ONLY WHERE REQUIRED

AMAF IND. INC

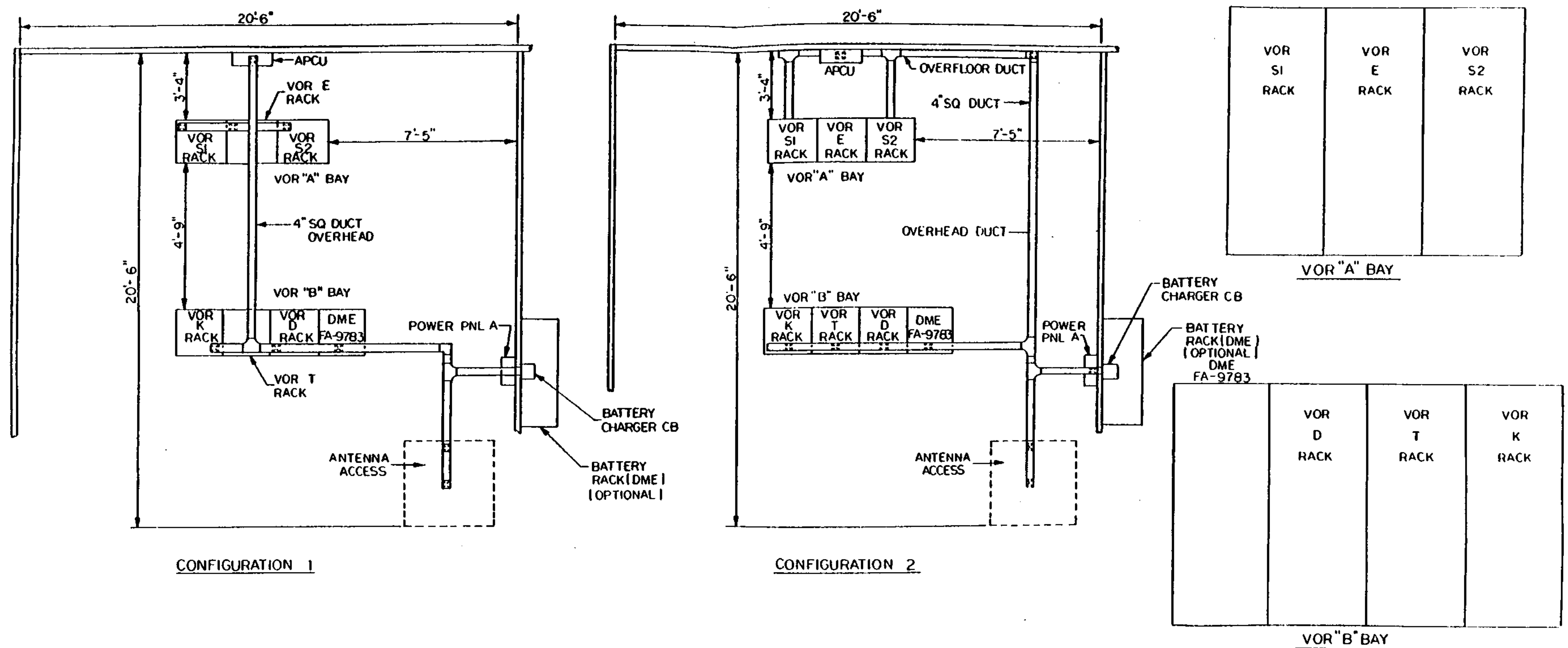
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9783 DME INSTALLATION
DME/VOR FLOOR PLAN
16' X 28' TYPE S BUILDING

AIRWAY FACILITIES SERVICE

DATE 6-25-82

D-6204-004



NOTE : ALL DIMENSIONS ARE APPROXIMATE

WIRING PANEL SCHEDULE - POWER DISTRIBUTION
1-PHASE 3 WIRE 120/240 VOLTS 225 AMP MAINS SURFACE MTD

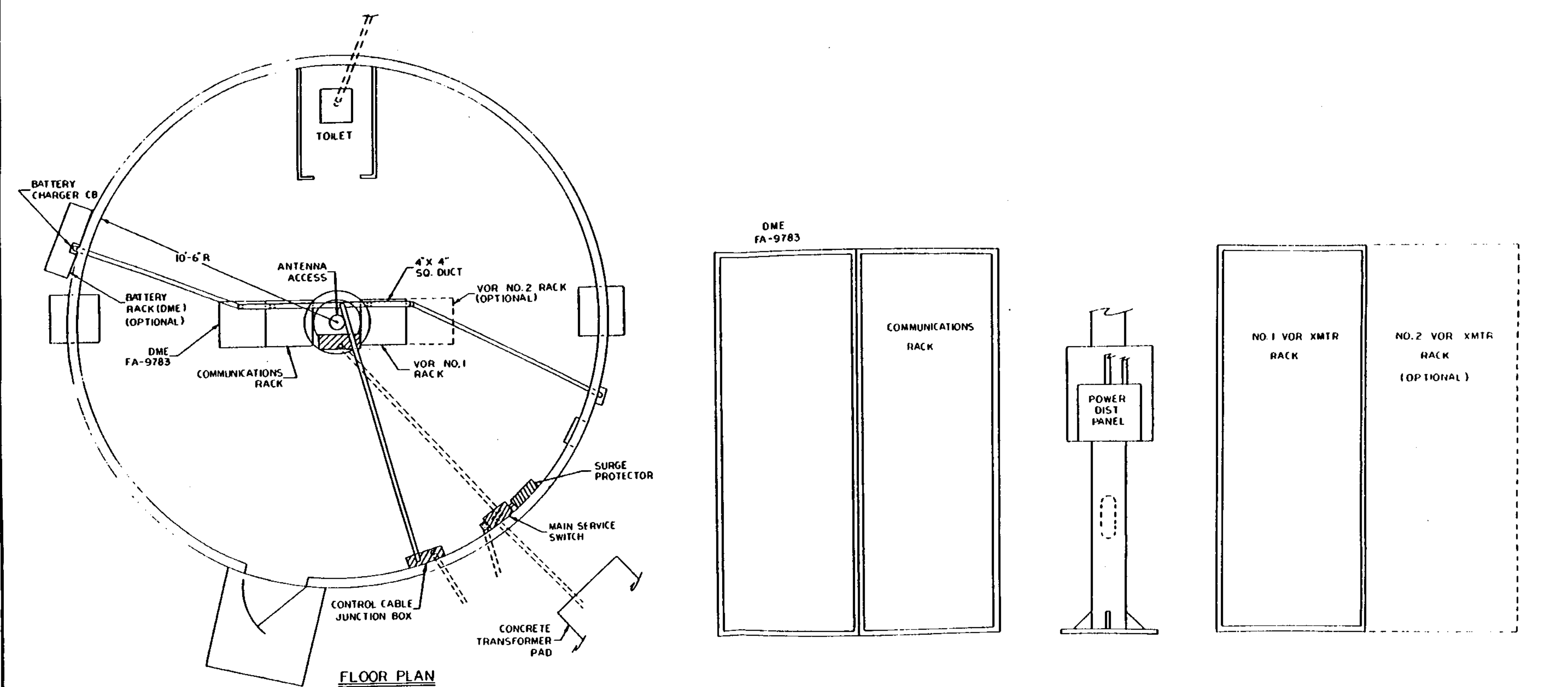
CIR CUIT	FOR	BREAKER POLES	TRIP	FRAME	VOLT	CIR CUIT	FOR	BREAKER POLES	TRIP	FRAME	VOLT
1						2					
3						4	OBSTRUCTION LIGHTS	1	15	100	120
5						6					
7	DME FA-9783	1	50	100	120	8					
9						10					
11						12					
13						14					
15						16					
17						18					
19						20					
21						22					
23						24					
25						26					

NOTE: OBSTRUCTION LIGHTS TO BE INSTALLED ONLY WHERE REQUIRED

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9783 DME INSTALLATION
DME/VOR FLOOR PLAN
36' X 36' TYPE S BUILDING

AIRWAY FACILITIES SERVICE
DATE 6-25-82
D-6204-005



WIRING PANEL SCHEDULE - POWER DISTRIBUTION

1-PHASE 3 WIRE 120/240 VOLTS 225 AMP MAINS SURFACE MTD

CIR-CUIT	FOR	BREAKER POLES	TRIP	FRAME	VOLT	CIR-CUIT	FOR	BREAKER POLES	TRIP	FRAME	VOLT
1						2					
3						4	OBSTRUCTION LIGHTS	1	15	100	120
5						6					
7	DME FA-9783	1	50	100	120	8					
9						10					
11						12					
13						14					
15						16					
17						18					
19						20					
21						22					
23						24					
25						26					

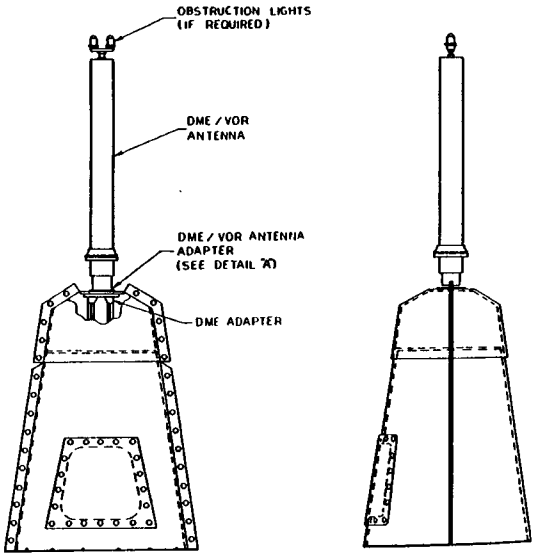
NOTE: OBSTRUCTION LIGHTS TO BE INSTALLED ONLY WHERE REQUIRED

AMAF IND. INC.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

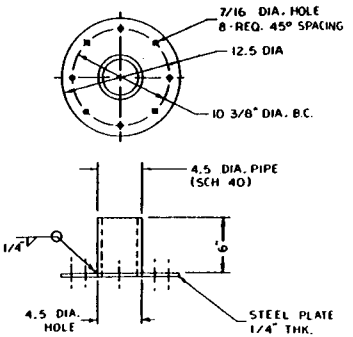
FA-9783 DME INSTALLATION
DME/VOR FLOOR PLAN
WILCOX SHELTER

AIRWAY FACILITIES SERVICE
DATE - 6-25-82
D-6204-006



FRONT VIEW

SIDE VIEW



DETAIL "A"

AMAF IND. INC.

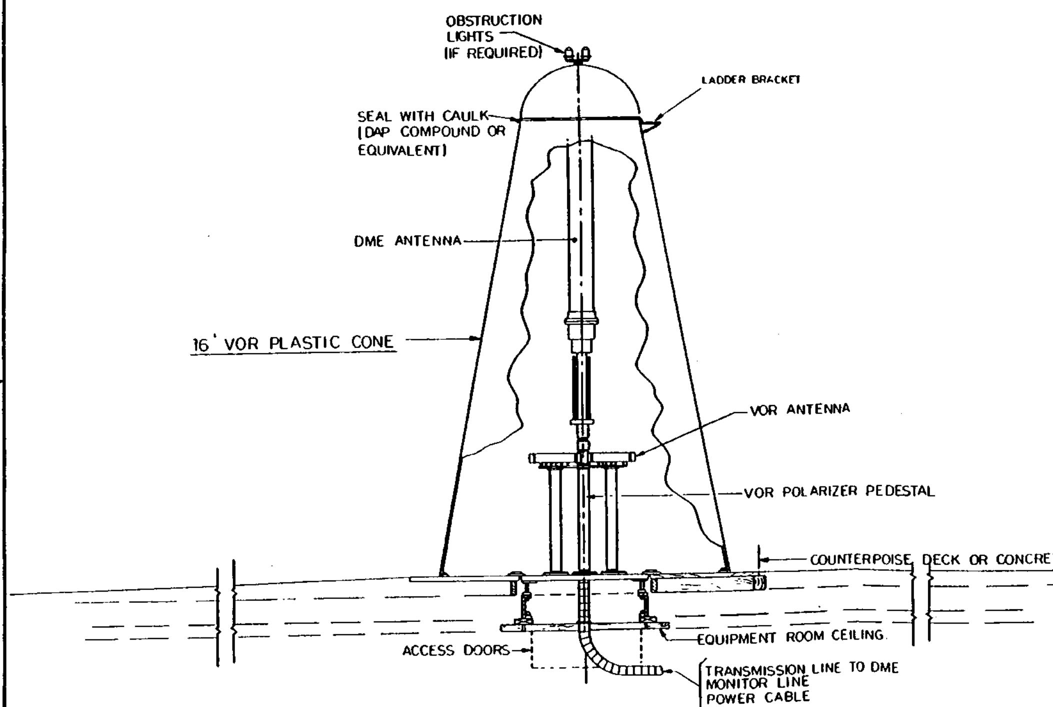
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

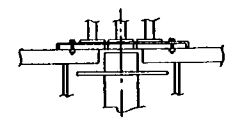
FA-9783 DME INSTALLATION
DME/VOR ANTENNA
WILCOX CONE

AIRWAY FACILITIES SERVICE

DATE - 6-25-82

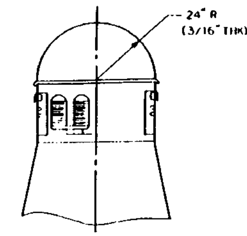
D-6204-007





ALTERNATE VIEW

PEDESTAL PLATE



ALT CONE COVER/WITHOUT TACAN ANTENNA

NOTE:
A LADDER BRACKET IS NOT NEEDED IF THE OBSTRUCTION LIGHTS ARE NOT REQUIRED.

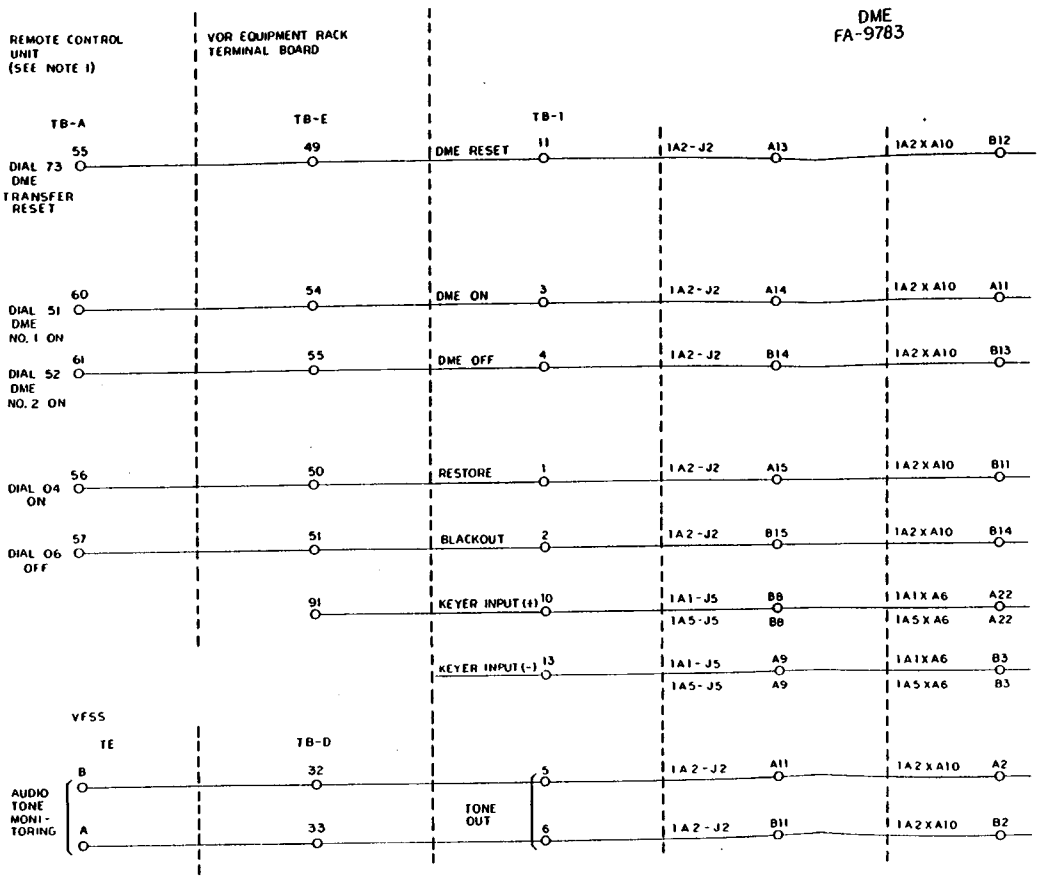
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9783 DME INSTALLATION
DME/VOR ANTENNA
16' VOR PLASTIC CONE

AIRWAY FACILITIES SERVICE

DATE 6-25-82

D-6204-008



NOTE 1 THE FOLLOWING CHAPTERS OF AF P 6790.1 MUST BE ACCOMPLISHED ON THE APPLICABLE REMOTE CONTROL UNITS

REMOTE CONTROL UNIT	CHANGE NO.	CHAPTER
CA-1482	156	239
CA-1603	157	240
CA-639/649	158	241
CA-1576	159	242
CA-1647	160	243
CA-1662	160	243
CA-1772	160	243
FA-5620	161	244
FA-5420	162	245

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9783 DME INSTALLATION

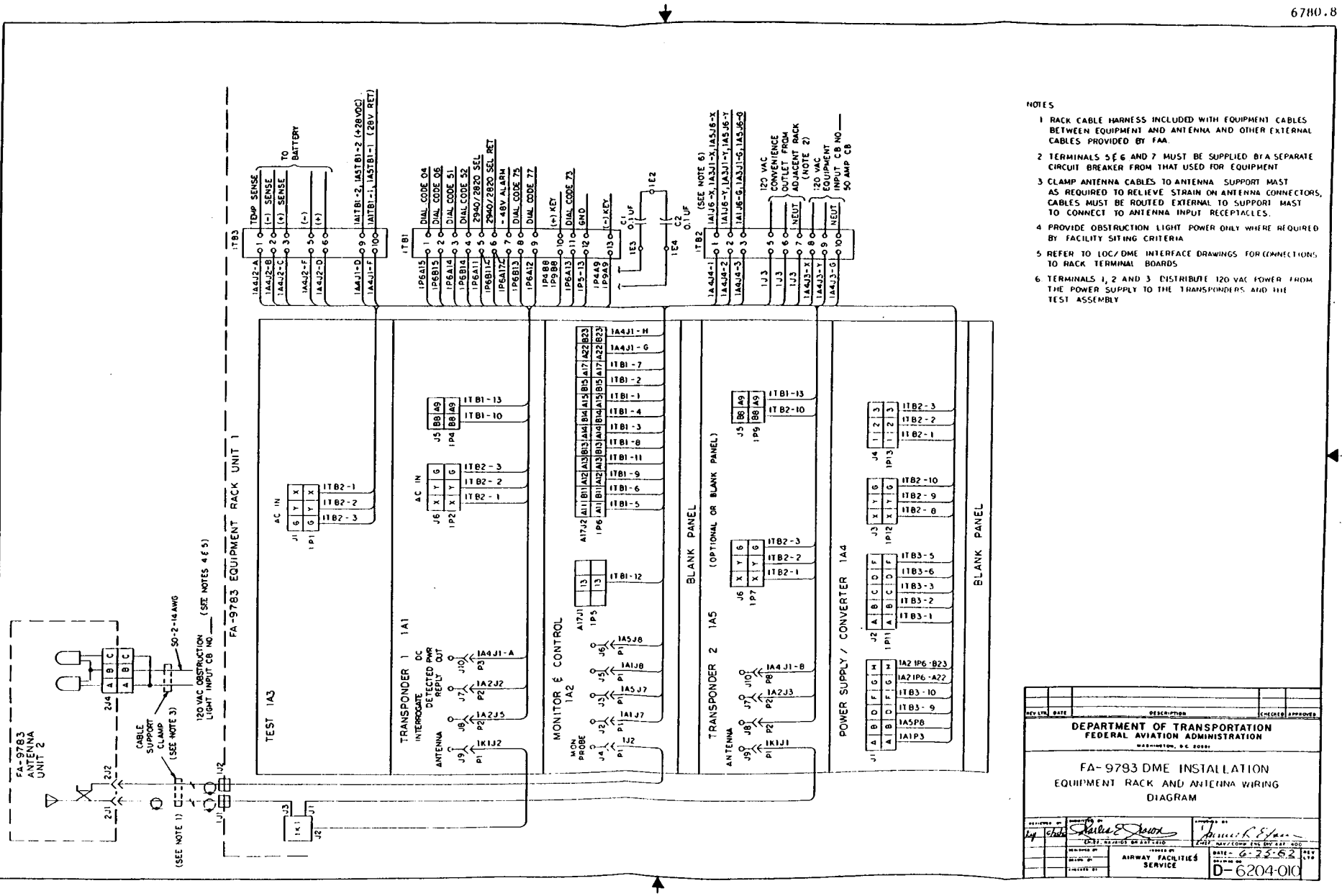
DME/VOR INTERFACE CONNECTIONS

AIRWAY FACILITIES SERVICE

DATE 6-25-82

D-6204-009

AMAF IND INC



NOTES

1. RACK CABLE HARNESS INCLUDED WITH EQUIPMENT CABLES BETWEEN EQUIPMENT AND ANTENNA AND OTHER EXTERNAL CABLES PROVIDED BY FAA.
2. TERMINALS 5 & 6 AND 7 MUST BE SUPPLIED BY A SEPARATE CIRCUIT BREAKER FROM THAT USED FOR EQUIPMENT
3. CLAMP ANTENNA CABLES TO ANTENNA SUPPORT MAST AS REQUIRED TO RELIEVE STRAIN ON ANTENNA CONNECTORS, CABLES MUST BE ROUTED EXTERNAL TO SUPPORT MAST TO CONNECT TO ANTENNA INPUT RECEPTACLES.
4. PROVIDE OBSTRUCTION LIGHT POWER ONLY WHERE REQUIRED BY FACILITY SITING CRITERIA
5. REFER TO LOC/DME INTERFACE DRAWINGS FOR CONNECTIONS TO RACK TERMINAL BOARDS
6. TERMINALS 1, 2 AND 3 DISTRIBUTE 120 VAC POWER FROM THE POWER SUPPLY TO THE TRANSPONDERS AND THE TEST ASSEMBLY

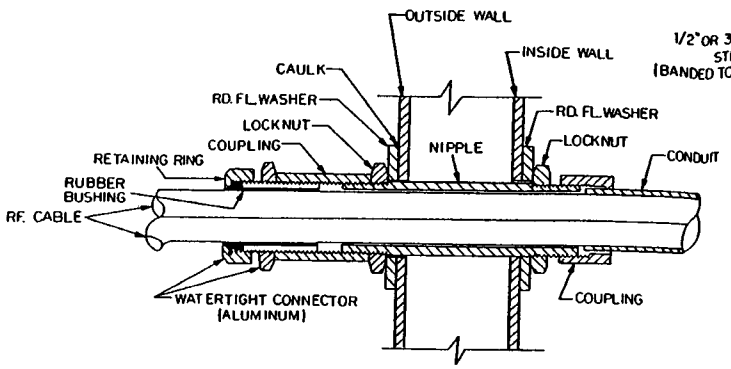
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9793 DME INSTALLATION
EQUIPMENT RACK AND ANTENNA WIRING DIAGRAM

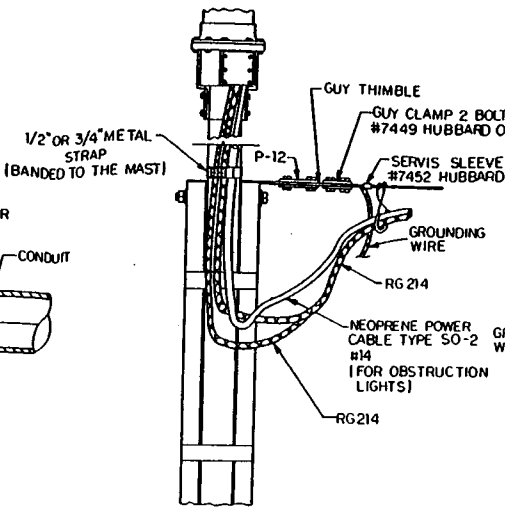
AIRWAY FACILITIES SERVICE

DATE - 6-25-82

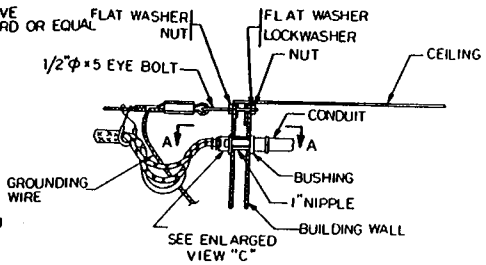
D-6204-010



ENLARGED VIEW "C"
(SHOWING CABLE ENTRANCE THRU BLDG WALL)

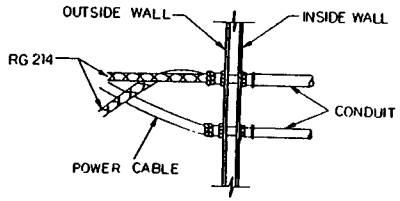


DETAIL "A"

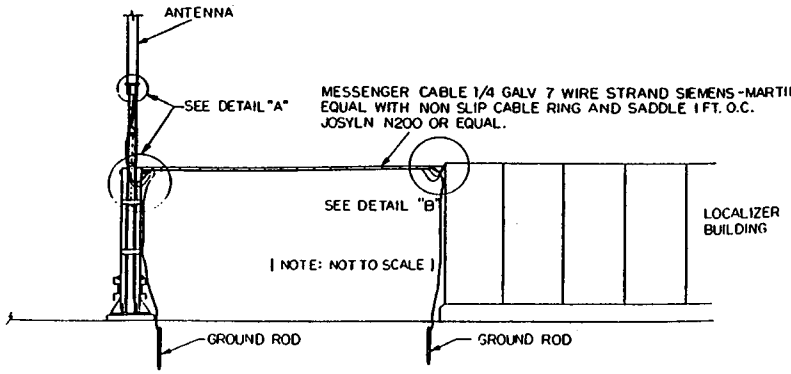


DETAIL B

WATERTIGHT CONNECTOR - HEX GLAND TYPES, THOMAS & BETTS OR EQUAL



SECTION A-A



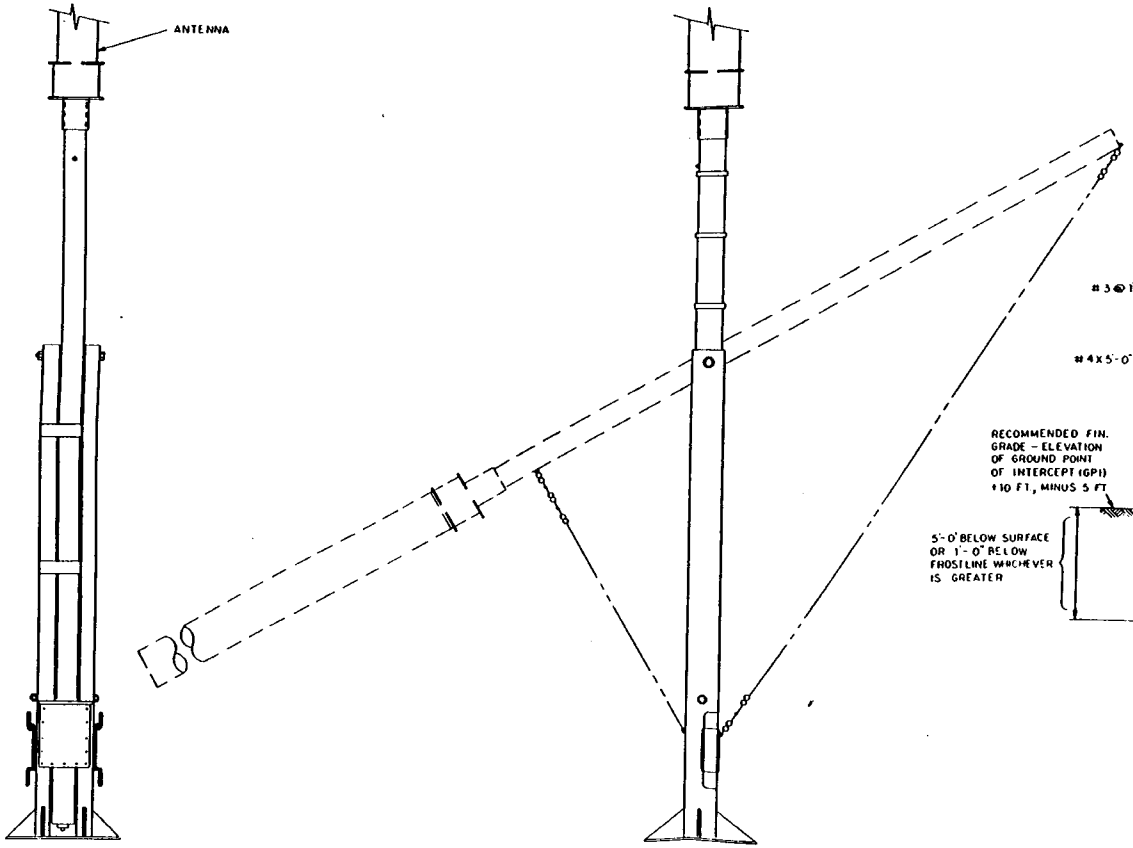
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

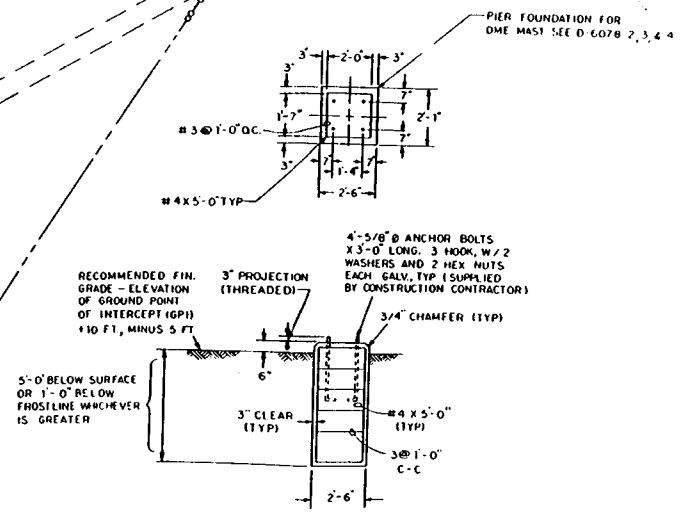
FA-9783 DME INSTALLATION
ANTENNA CABLE INSTALLATION

AIRWAY FACILITIES SERVICE

DATE - 6-25-82

D-6204-011





ELEVATION
PIER FOUNDATION
FOR DME MAST

NSN 5985-01-043-3106

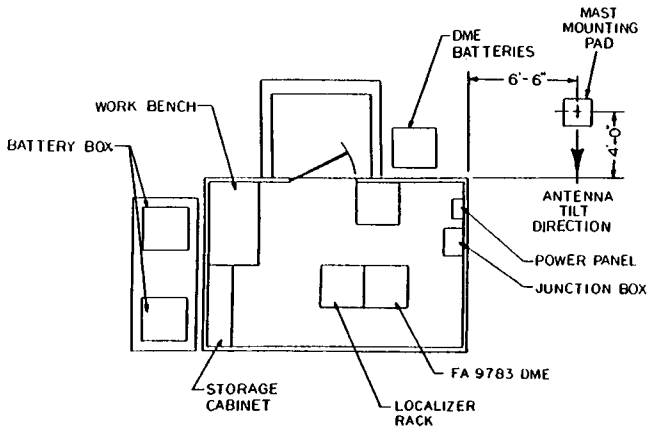
REVISIONS			
REV NO.	DATE	DESCRIPTION	CHECKED / APPROVED

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

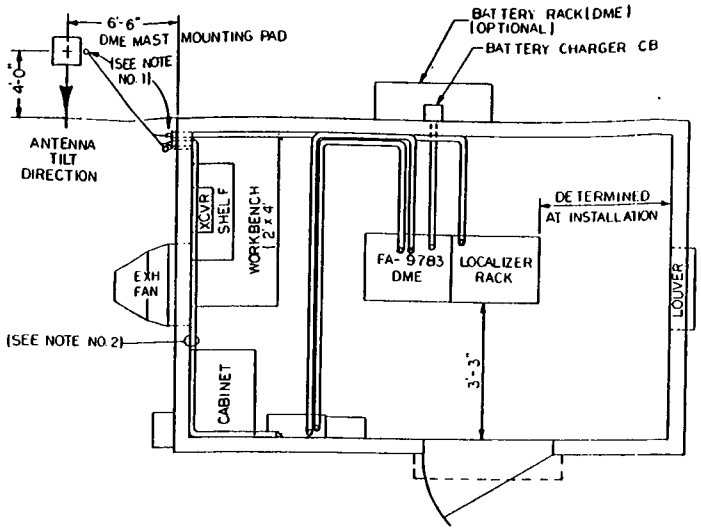
FA-9783 DME INSTALLATION
HINGED MAST AND MOUNTING BASE

DESIGNED BY		APPROVED BY	
DRAWN BY		ISSUED BY	DATE 6-23-82
TRACED BY		AIRWAY FACILITIES SERVICE	DRAWING NO. D-6204-012

AMAF IND. INC.



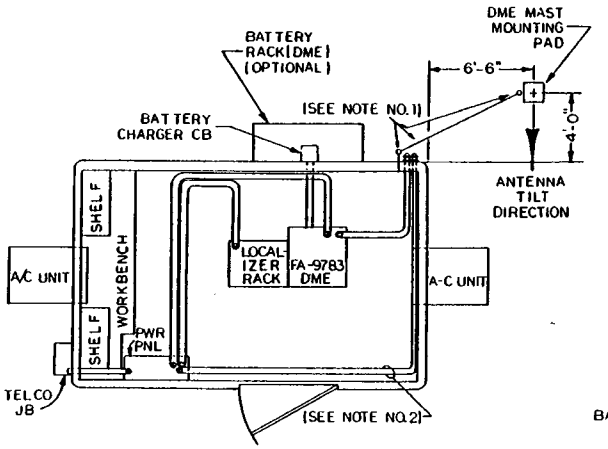
CAT III



MARK I-B

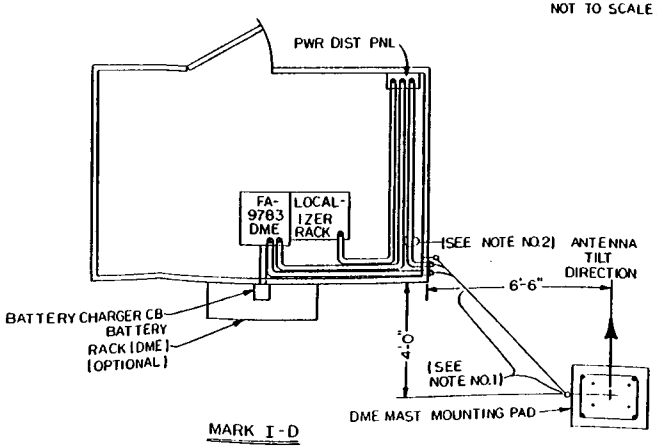
NOTES:

1. SEE DETAILS OF MESSENGER AND POWER CABLES ON DRAWING NO. D-6204-011
2. CONDUIT FROM POWER DISTRIBUTION PANEL FOR POWER TO OBSTRUCTION LIGHTS IF REQUIRED.
3. THE MARK I-A AND MARK I-E CONFIGURATIONS ARE NOT SHOWN. THE MARK I-A RESEMBLES THE MARK I-B, AND THE MARK I-E RESEMBLES THE MARK I-D.
4. CONDUIT SIZE PER NEC.



MARK I-C

NOTE:
NOT TO SCALE.



MARK I-D

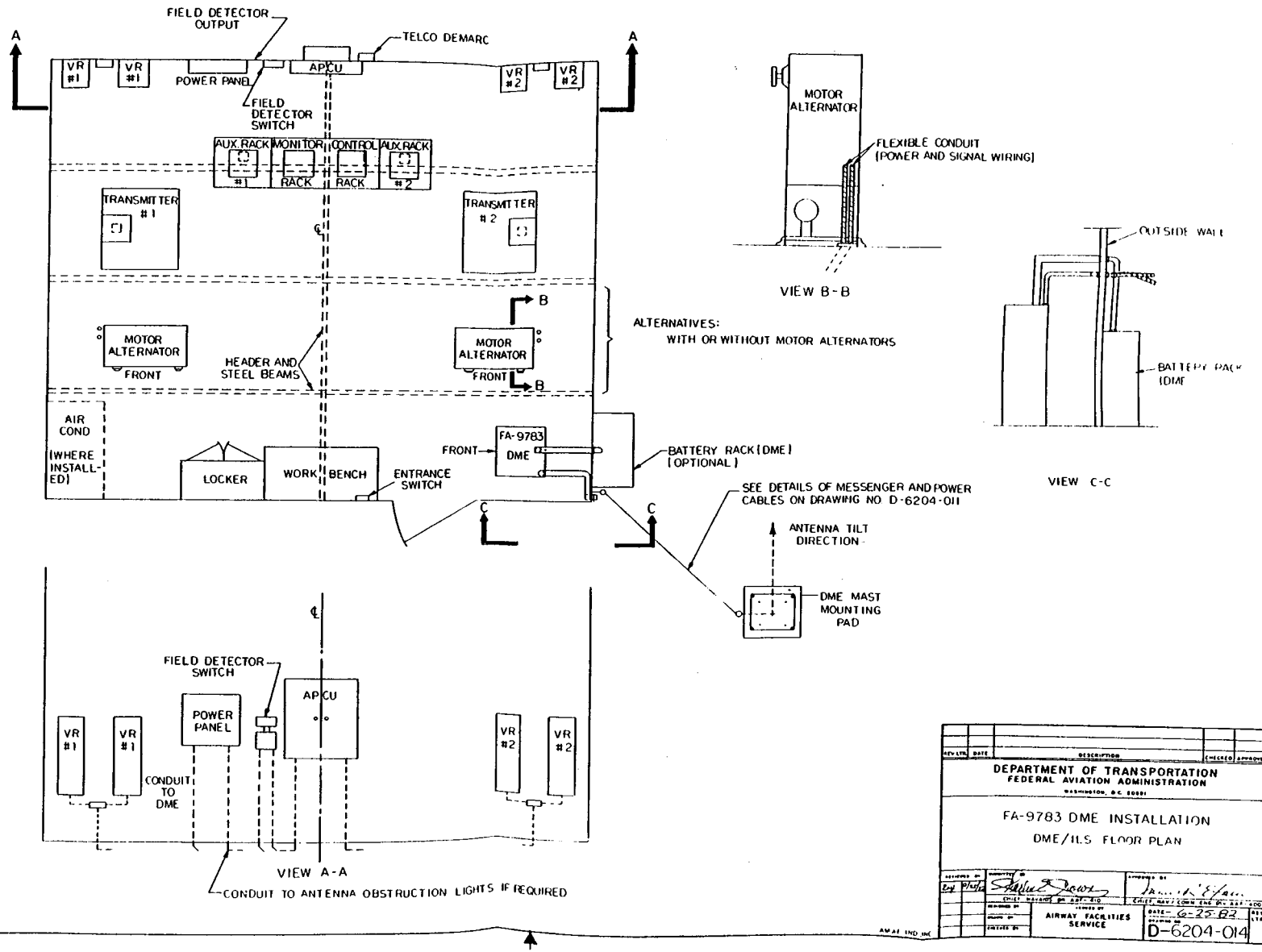
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

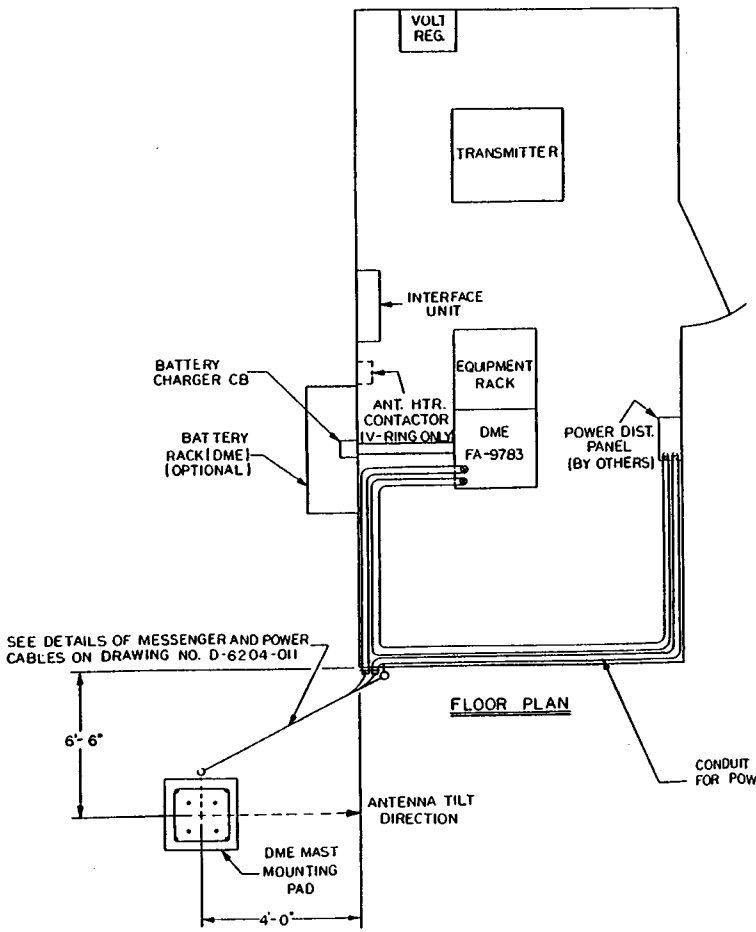
FA-9783 DME INSTALLATION
DME/ILS MARK I FLOOR PLAN

AIRWAY FACILITIES SERVICE

DATE - 6-25-82

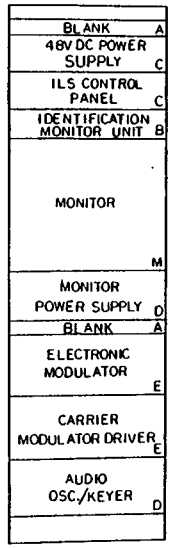
D-6204-013


FIELD DETECTOR OUTPUT
TELCO DEMARC
A
A
VR #1
VR #1
POWER PANEL
APCU
VR #2
VR #2
FIELD DETECTOR SWITCH
AUX. RACK #1
MONITOR RACK
CONTROL RACK
AUX. RACK #2
TRANSMITTER #1
TRANSMITTER #2
MOTOR ALTERNATOR
FRONT
HEADER AND STEEL BEAMS
B
B
MOTOR ALTERNATOR
FRONT
ALTERNATIVES:
WITH OR WITHOUT MOTOR ALTERNATORS
AIR COND (WHERE INSTALLED)
LOCKER
WORK BENCH
ENTRANCE SWITCH
FRONT
FA-9783 DME
BATTERY RACK (DME) (OPTIONAL)
C
C
SEE DETAILS OF MESSENGER AND POWER CABLES ON DRAWING NO D-6204-011
ANTENNA TILT DIRECTION
DME MAST MOUNTING PAD
MOTOR ALTERNATOR
FLEXIBLE CONDUIT (POWER AND SIGNAL WIRING)
VIEW B-B
OUTSIDE WALL
BATTERY PACK (DME)
VIEW C-C
FIELD DETECTOR SWITCH
POWER PANEL
APCU
VR #1
VR #1
VR #2
VR #2
CONDUIT TO DME
VIEW A-A
CONDUIT TO ANTENNA OBSTRUCTION LIGHTS IF REQUIRED
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
FA-9783 DME INSTALLATION
DME/ILS FLOOR PLAN
AIRWAY FACILITIES SERVICE
D-6204-014

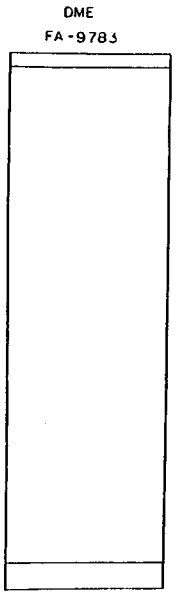


FLOOR PLAN

(NOTE: NOT TO SCALE)



EQUIPMENT RACK LAYOUT



NOTE
1 - CONDUIT SIZE PER NEC.

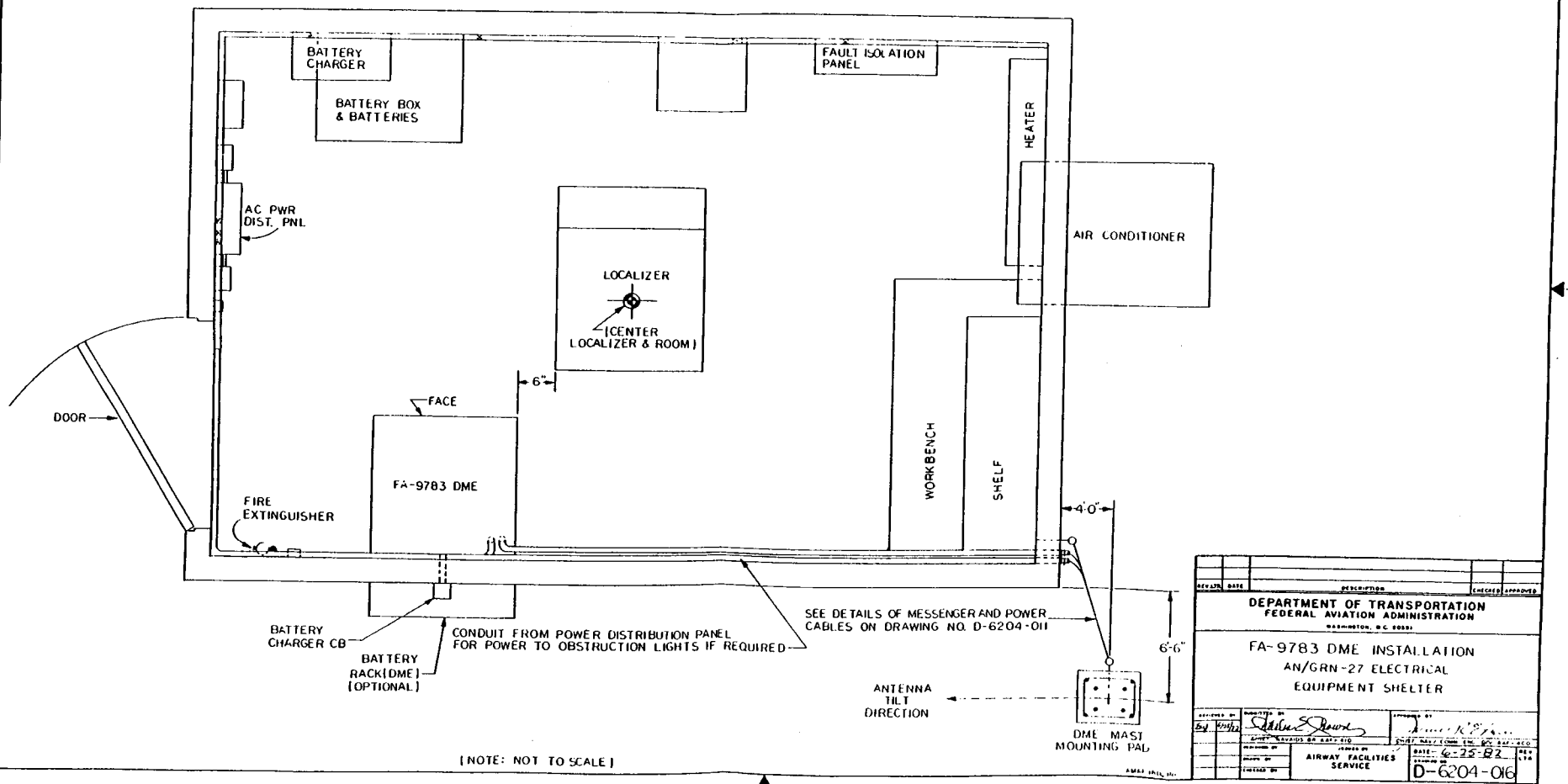
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FA-9783 DME INSTALLATION
DME/ILS FLOOR PLAN
87"X184" ENCLOSURE

AIRWAY FACILITIES SERVICE

DATE - 6-25-82

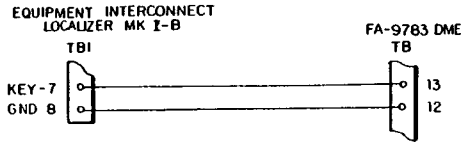
D-6204-015


BATTERY CHARGER
BATTERY BOX & BATTERIES
FAULT ISOLATION PANEL
HEATER
AC PWR DIST. PNL
AIR CONDITIONER
LOCALIZER
(CENTER LOCALIZER & ROOM)
6"
FACE
DOOR
FA-9783 DME
WORKBENCH
SHELF
FIRE EXTINGUISHER
4'0"
SEE DETAILS OF MESSENGER AND POWER CABLES ON DRAWING NO. D-6204-011
BATTERY CHARGER CB
CONDUIT FROM POWER DISTRIBUTION PANEL FOR POWER TO OBSTRUCTION LIGHTS IF REQUIRED
BATTERY RACK(DME) (OPTIONAL)
6'-6"
ANTENNA TILT DIRECTION
DME MAST MOUNTING PAD
(NOTE: NOT TO SCALE)
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591
FA-9783 DME INSTALLATION
AN/GRN-27 ELECTRICAL
EQUIPMENT SHELTER
AIRWAY FACILITIES SERVICE
DATE 6-25-82
D-6204-016

NOTES:
1. SHIELDED PAIR CABLE SHOULD BE UTILIZED FOR KEYING INTERFACE WIRING
2. IT WILL BE NECESSARY TO GROUND 4J1 PIN C TO A CONVENIENT GROUND WITHIN THE TRANSMITTER CHASSIS. THIS SHOULD BE ACCOMPLISHED BY ATTACHING A LUG TO ONE END OF A 2" LENGTH OF NO.22 HOOK-UP WIRE AND SECURING IT ELECTRICALLY AND MECHANICALLY WITH MOUNTING HARDWARE OF 4J1, AND SOLDERING THE OTHER END TO 4J1 PIN C. SEE FA-P-6750.1 CHAP. 184

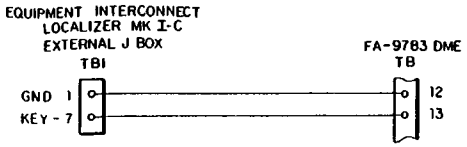
DME KEYING INTERFACE MK I-B

DME CAM
CAM DEPRESSION OF APPROXIMATELY 90° SHOULD BE SET AND CHECKED SO THAT THE DME IDENTS ONCE AFTER 3 LOCALIZER IDENT CYCLES



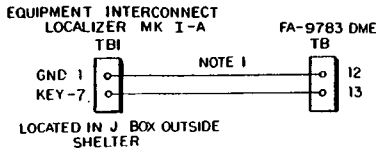
DME KEYING INTERFACE MK I-C

DME STRAP
DISCONNECT 6A3E3 FROM 6A3E2
CONNECT 6A3E1 TO 6A3E2



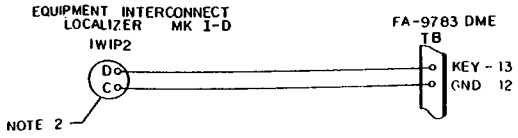
DME KEYING INTERFACE MK I-A

DME STRAP
DISCONNECT 6A3E3 FROM 6A3E2
CONNECT 6A3E1 TO 6A3E2



DME KEYING INTERFACE MK I-D AND MK I-E

DME STRAP
DISCONNECT 6A3E3 FROM 6A3E2
CONNECT 6A3E1 TO 6A3E2



DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9783 DME INSTALLATION

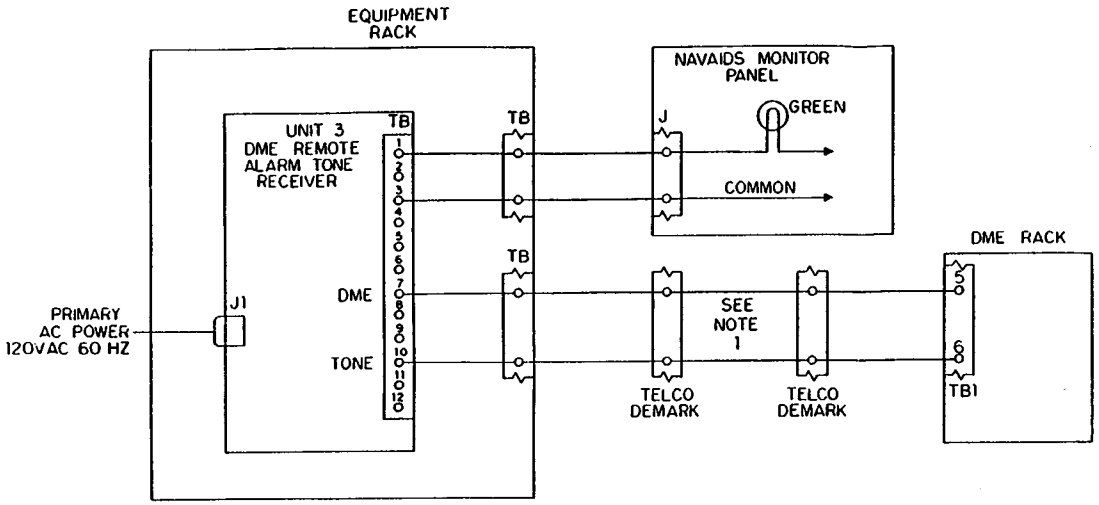
DME/ILS MARK I KEYING INTERFACE

AIRWAY FACILITIES SERVICE

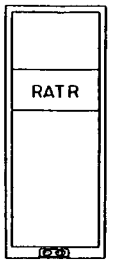
D-6204-017

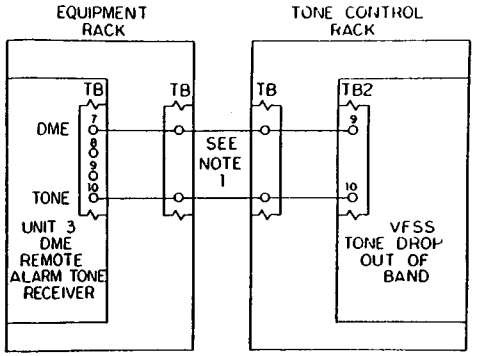
AMAF IND. INC.

NOTE
1 - PHONE LINES REQUIRE LIGHTNING PROTECTION AT EACH END

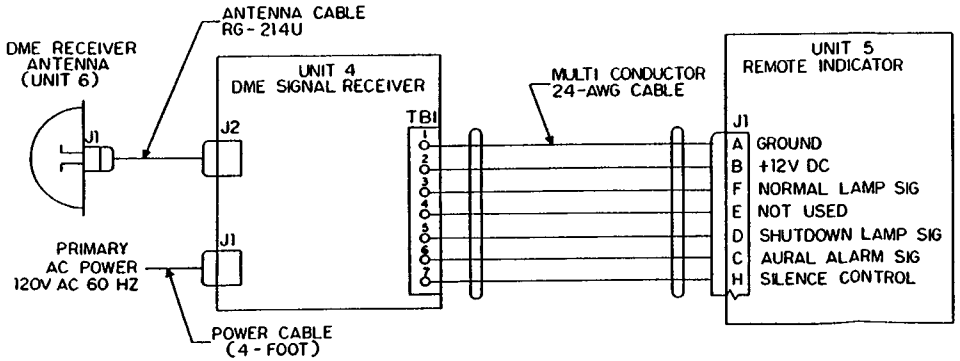


DME REMOTE ALARM TONE RECEIVER (RATR) DIAGRAM

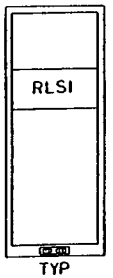




OPTIONAL
IF USED WITH VFSS



DME RADIO LINK STATUS INDICATOR (RLSI) DIAGRAM



☆ REF INSTRUCTION BOOKS TI 6730__ FOR RATR AND TI 6730__ FOR RLSI

AMAF IND INC

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FA-9783 DME INSTALLATION
RATR AND RLSI
INTERCONNECTION DIAGRAMS

AIRWAY FACILITIES SERVICE

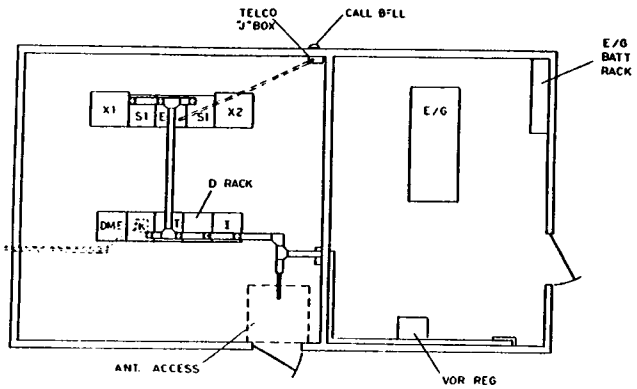
DATE- 6-25-82

D-6204-018

(To Be Supplied)

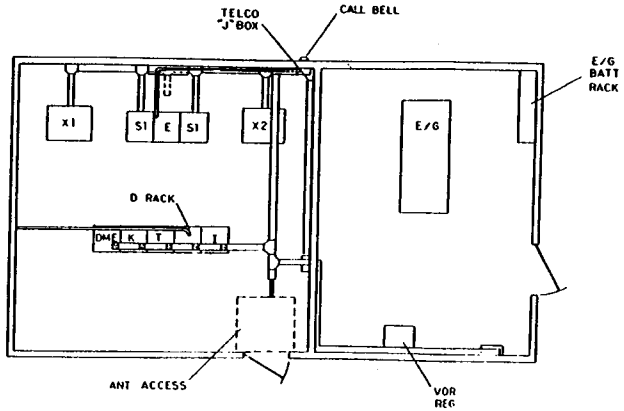
FA-9783 DME Installation
DME Battery Charger
Interconnection Diagram

D-6204-019



DETAIL A

(PLAN A)
EXIST FLOOR PLAN & DUCT LAYOUT
VOR / DME FACILITY



DETAIL B

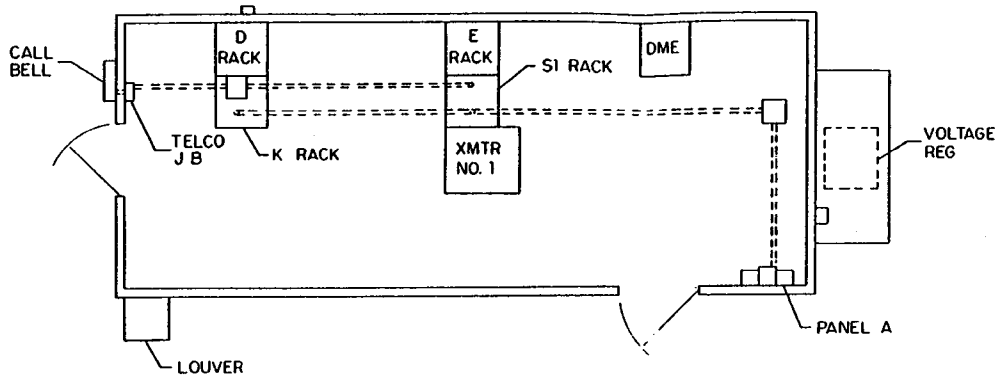
(PLAN B)
EXIST FLOOR PLAN & LAYOUT
VOR / DME FACILITY
(SIDE ACCESS XMTR'S W/ SEPERATE ANT. PHASER)

REV LTR	DATE	DESCRIPTION	CHECKED	APPROVED

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9783 DME INSTALLATION
20 FT. X 36 FT. TYPE "S" BUILDING
FLOOR PLAN

DESIGNED BY	DRAWN BY	APPROVED BY	
by 1982		CHIEF, NAVAIDS BR AAR-410	CHIEF, NAV/COMM ENG. DIV AAF-400
REVIEWED BY		AIRWAY FACILITIES SERVICE	DATE 6-25-82
ISSUED BY			DRAWING NO. D-6204-020
CHECKED BY			REV LTR



NOTES

1. CONDUIT SIZE PER NEC

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20591

FA-9783 DME INSTALLATION
DME/VOR FLOOR PLAN
10' x 24' TRAILER

AIRWAY FACILITIES SERVICE

DATE- 6-25-82

D-6204-021

AMAF IND INC

CHAPTER 4. DME INSTALLATION GUIDANCE

28. INTRODUCTION. This chapter documents a step-by-step procedure for installing the DME, its antenna, and its associated RATR and RLSI. The installation steps are listed in table 4-1; references to detailed text are in chapter 5, Installation Standards. Before implementing the installation steps in table 4-1, the cognizant FAA field activity or assigned installation contractor should thoroughly review chapters 2 and 3 of this order to understand the DME installation equipment's physical characteristics, where it will be located, cable routing paths, and necessary wiring connections.

29. INSTALLATION SUMMARY. Briefly, the assigned DME installation personnel shall perform the following:

a. Unpack and inspect the DME equipment.

b. Install the DME system equipment rack frame, locate it as shown in the applicable chapter 3 drawings, and anchor it to the facility floor.

c. At DME installations, a power cable shall be routed from the ac power distribution panel to the DME and from the ac power distribution panel to the DME antenna if obstruction lighting is required. The DME antenna signal cable shall be routed from the DME to its antenna.

(1) At DME/VOR installations the power cables shall be routed in existing 4- by 4-inch square duct. Signal cables shall be routed in new 4- by 4-inch square duct or otherwise segregated from power cables. Antenna access is indicated on the appropriate facility floor plan drawings.

(2) At DME/ILS installations within the enclosure, the power and signal cables shall be routed respectively in 0.75-inch and 1.25-inch thin-wall conduit installed as part of the overall DME installation. External to the enclosure, the cables shall be routed above ground via a messenger cable to the antenna mast (see drawing D-6204-011).

d. At applicable sites, install a lead calcium or nickel cadmium battery pack as specified in applicable chapter 3 drawings. DME dc power cable shall be routed from the battery pack to the DME as specified in applicable site location drawings.

e. At DME/VOR installations, the existing 16-foot (or Wilcox) cone shall be modified, as specified herein, for mounting the DME antenna. At the DME/ILS facilities, a dedicated DME antenna mast

TABLE 4-1. DME INSTALLATION PROCEDURE

Task	Definition	Chapter 5, Installation Standards	Comments/Notes
1	Unpack, inspect, and inventory the DME and its antenna. • Unpacking and repacking. • Check equipment supplied. • Damaged equipment. • Visual inspection.	32 General	• Do not roll antenna; lift and carry it after unpacking.
2	Locate DME in accordance with chapter 3 drawings. • Anchor rack to facility floor. • Bolt rack to adjacent equipment rack.	33 Rack Cabinet Installation	• Where the DME is freestanding (drawings D-6204-013 and -016), the DME rack shall be anchored at each corner.
3	Install oscilloscope on the test assembly (unit 1A).	34 Installation of Test Oscilloscope	
4	At DME/ILS installations: • Refer to chapter 3 and drawings D-6204-013 through -016. • Install thin-wall conduit or 4- by 4-inch square duct in accordance with the applicable ILS enclosure floor plans of chapter 3. • Route power cables and antenna signal cables in thin-wall conduit or 4- by 4-inch square duct. 1) DME ac power cable, ac power panel to DME. 2) DME dc power cable, battery pack to DME. 3) Antenna obstruction light power cable, power panel to antenna. 4) Antenna signal cables, DME to antenna.	Section 2 Wiring and Cabling Section 3 Grounding, Shielding, and Bonding	• Where the DME rack is freestanding (drawings D-6204-013 and -016), an additional power cable shall be routed from the ac power distribution panel to the DME for providing ac power to the DME rack convenience outlet. • Once the power cables have been wired to the ac power distribution panel and the battery pack (if applicable), appropriate safety precautions shall be taken to prevent energizing the DME (leave the breakers in the OFF position).

TABLE 4-1. DME INSTALLATION PROCEDURE (continued)

Task	Definition	Chapter 5, Installation Standards	Comments/Notes
	• Position DME antenna mast in accordance with drawings D-6204-013 through -016. • Drill coupling connector and messenger cable eyebolt holes in accordance with drawing D-6204-011. • Insert conduit coupling connectors and eyebolt in enclosure wall, route obstruction light and signal cables through the enclosure wall, and seal the connector in accordance with drawing D-6204-011. • Install messenger cable between enclosure and antenna mast in accordance with drawing D-6204-011. • Route antenna cables, via the messenger cable, from the enclosure to the antenna mast. • Band the cables to the mast, leaving sufficient length for installing the type N connectors on the signal cables and the multipin connector on the obstruction light power cable.	35 Omnidirectional Antenna Installation	• Antenna mast pier foundation shall be installed in advance of the DME installation. Antenna base height shall be selected to clear the radiation obstruction of the localizer building. Antenna mast must be high enough to provide los from the base of the antenna to the distant horizon. • The DME shall not be energized until the installation is completed. The DME shall be energized in accordance with the reference DME manufacturer's handbook. • Provide a drip loop in the antenna cables as shown on drawing D-6204-011. • Refer to step 7 for completing antenna connector attachments.
5	At DME/VOR installations: • Refer to drawings D-6204-001 through -006. • In the existing 4- by 4-inch square duct, cut the ducting above the DME top panel's rear closure plate and install a duct T-adapter fitting and 4- by 4-inch square duct after removing the rear closure plate.	Section 2 Wiring and Cabling Section 3 Grounding, Shielding, and Bonding	• All cables routed to and from the DME shall be routed via the top panel's rear closure plate opening. • Once the power cables have been wired to the ac power distribution panel and the battery pack (if applicable), appropriate safety precautions shall be taken to prevent energizing the DME.

TABLE 4-1. DME INSTALLATION PROCEDURE (continued)

Task	Definition	Chapter 5, Installation Standards	Comments/Notes
	• Route the DME power cables, in the 4- by 4-inch duct, from the ac power distribution panel and the battery pack to the DME. • Route the antenna obstruction lights' power cable from the ac power distribution panel to the antenna access point in the 4- by 4-inch square duct. • Route the antenna signal cable in the new 4- by 4-inch square duct from the DME to the antenna access point or other site separated from the power cables. • Adapt existing 16-foot VOR antenna cone (or Wilcox VOR antenna cone) (drawings D-6204-007 and -008). • Fabricate 16-foot cone cover plate (or DME/Wilcox adapter ring). • Remove TACAN[1]/ mounting fixture (or Wilcox closure ring). • Install DME/Wilcox adapter ring. • Remove DME antenna obstruction lights if not required. • Install DME antenna or VOR polarizer pedestal (or DME/Wilcox adapter ring). • Secure six bolts. • Install 16-foot cone cover plate extending obstruction light conduit if required. • Caulk as required.	35 Omnidirectional Antenna Installation	• The DME shall not be energized until after the installation is complete and in accordance with the reference manufacturer's equipment handbook. • Refer to step 6 for completing antenna connector attachments. • Obstruction lights installed only where required. • Before any work is performed above the counterpoise level, a facility shutdown must be arranged in accordance with standard FAA procedures. • Use DAP caulking compound or equivalent.

TABLE 4-1. DME INSTALLATION PROCEDURE (continued)

Task	Definition	Chapter 5, Installation Standards	Comments/Notes
6	External cabling interconnections: • Attach the appropriate connectors to the DME antenna cables. • Attach spade lugs to the DME power cable at the DME rack. • Cut and assemble DME equipment interconnection cables with spade lugs. • Ground the DME rack to the adjacent equipment rack. • Wire the DME rack convenience outlet in parallel with the adjacent equipment rack's convenience outlet. • Connect external cabling to associated terminal boards in equipment racks.	36 External Cabling Interconnections Section 2 Wiring and Cabling Section 3 Grounding, Shielding, and Bonding	• Where the DME is freestanding, ground the rack to the ac power distribution panel at a convenient point and wire the DME rack convenience outlet to the ac power distribution panel via the additional power cable installed in step 4 above. The power cable shall be wired to a circuit breaker dedicated to convenience outlets. Equipment grounding conductors are run with related ac cabling. • Where the DME is not freestanding and no additional power cable was run for convenience outlet.
7	Install test assembly, transponder(s) monitor and control assembly, and power supply and complete cabling connections as shown in drawing D-6204-010.	37 Installation of Unit 1 Assemblies	• Pack shall be anchored at each corner.
8	Locate battery pack in accordance with chapter 3 drawings.	Section 4 Battery Pack Installation	
9	Unpack and inspect the RLSI.	51 General 52 Unpacking and Repacking	
10	RLSI external cabling interconnections: • Cable assembly. • Attach connectors.	53 RLSI External Cabling Interconnections	

TABLE 4-1. DME INSTALLATION PROCEDURE (continued)

Task	Definition	Chapter 5, Installation Standards	Comments/Notes
11	Install the RLSI DME signal receiver (unit 4), the RLSI DME receiver antenna (unit 6), and the remote indicator (unit 5).	54 Installation of DME Signal Receiver Unit 4 55 Installation of Remote Indicator Unit 5 56 Installation of DME Receiver Antenna Unit 6	• The RLSI antenna shall be installed within 25 miles los from the DME. • The RLSI signal receiver and the remote indicator shall be installed at the electrical equipment room in the air traffic control tower.
12	Unpack and inspect the RATR.	59 General 60 Unpacking and Repacking RATR	
13	RATR external cabling interconnections.	61 RATR External Cabling Interconnections	
14	Install the DME RATR (unit 7).	62 Installation of the DME RATR Unit 7	

shall be installed where indicated on the enclosure floor plans. At facilities with a dome antenna shelter, the regions should take action to install the standard 16-foot VOR plastic cone as shown in drawing D-6204-008.

f. Once the external DME cabling has been installed, install the DME rack components and perform internal wiring connections in accordance with the applicable chapter 3 or chapter 5 interconnection diagrams.

(1) Where mounted adjacent to another equipment rack, the DME rack shall be grounded to the adjacent equipment rack. If the DME rack is freestanding, ground the rack to the ac power distribution panel at a convenient point and wire the convenience outlet to the ac power distribution panel at a circuit breaker dedicated to convenience outlets. All grounding shall be accomplished in accordance with the National Electrical Code (NEC) and the latest edition of standard FAA-STD-020, Transient Protection, Grounding, Bonding, and Shielding Requirements for Equipment. Section 3 of chapter 5 contains detailed instructions for grounding.

(2) The DME rack electronic equipment shall be wired to the ac power distribution panel at a 50-ampere (A) circuit breaker for a 1000-W DME or at a 30-A circuit breaker for a 100-W DME dedicated to the DME electronic equipment.

(3) The DME rack convenience outlet shall be wired in parallel with the adjacent equipment rack's convenience outlet.

g. Install the remotely located RLSI or RATR in the air traffic control tower or control facility maintenance electronic equipment room and perform the required wiring interconnections.

h. Install the RLSI antenna within 25 miles in los from the DME antenna and route the antenna cables to the RLSI.

i. Before energizing the DME and its associated equipment, review applicable manufacturer-furnished equipment manuals.

30. INSTALLATION PROCEDURE. Table 4-1 is the step-by-step procedure for installing the DME, its antenna, its battery pack (if applicable), and its associated RLSI and RATR. The procedure is applicable to all DME system installations. Table 4-1 identifies each task, provides references to the applicable chapter 3 drawings or detailed text in the installation standards (chapter 5), and provides appropriate comments. The installation standards of chapter 5 are an integral part of the procedure and shall be adhered to during installation. Before implementing the procedure, the assigned DME installation

personnel shall review table 4-1, the referenced text, and the drawings. Depending upon the facility and the size of the installation staff, some of the tasks can be performed in parallel to expedite installation.

31. RESERVED.

CHAPTER 5. INSTALLATION STANDARDS

SECTION 1. EQUIPMENT INSTALLATION

32. GENERAL, DME EQUIPMENT.

a. Unpacking and Repacking. The DME type FA-9783 is shipped in five separate shipping containers. Table 5-1 lists the contents of each container and should be used to check the bill of materials and the actual shipments. Care should be taken in unpacking the equipment to avoid damage. It is recommended that packing for reshipment be accomplished using the same containers and cushioning fillers with which the equipment was originally packed. If these materials are not available, care should be taken to provide adequate cushioning and sturdy shipping containers as required by the latest edition of specification MIL-E-17555, Electronic and Electrical Equipment, Accessories and Repair Parts; Packaging and Packing of. After opening the shipping container and removing the cushioning fillers, perform the steps described in paragraphs 32b through d in sequence.

b. Check Equipment Supplied. Check the contents of each container listed in table 5-1 to ensure that the DME ground station equipment is complete. Shipping container 1 contains the equipment rack (unit 1), shipping container 2 contains the monitor and control (unit 1A) and test (unit 1B) assemblies, shipping container 3 contains the power supply (unit 1C), shipping container 4 contains the transponder (unit 1D) or two transponders (units 1D1 and 1D2) in the dual version, and shipping container 5 contains the omnidirectional antenna (unit 2). Figure 5-1 shows the equipment rack with all unit 1 assemblies installed. Figure 5-2 shows equipment rack dimensions, terminal board locations, and external cable routing. The DME antenna (unit 2) is shown in figure 2-10.

c. Damaged Equipment. Examine the contents of the containers for signs of shipping damage. Particularly check to see if the containers show signs of mishandling. If any equipment is found to be damaged, no attempt should be made to remove, install, or operate it. Inform the carrier as to the nature of the damage before returning the equipment to the factory.

d. Visual Inspection. After opening all the containers, removing all packing materials or interior restraints, and checking for shipping damage, the DME units are ready to be moved onto a flat, clean surface for a thorough inspection.

(1) Remove equipment rack (unit 1) and associated connectors from shipping container 1 and place unit 1 on a clean, flat surface. Carefully inspect the rack for signs of damage.

TABLE 5-1. DME SHIPPING LIST

Item	Quantity	FAA Type	Part Number[1/]
A. Shipping Container 1:			
Equipment Rack (unit 1)	1	FA-9783	
B. Shipping Container 2:			
Monitor and Control Assembly	1	FA-9783/4	
Test Assembly	1	FA-9783/1	
C. Shipping Container 3:			
Power Supply	1	FA-9783/5	
D. Shipping Container 4:			
Transponder 1	1	FA-9783/2	
Transponder 2 (optional)	1	FA-9783/3	
E. Shipping Container 5:			
Omnidirectional Antenna (unit 2)	1	FA-9783/6	505267
F. Type N Connector for Monitor Probe Cable	2		M39012/1-0005
G. Multipin Connector for Obstruction Lights	1		MS3106E-16-IOS

[1/] Part number to be supplied.

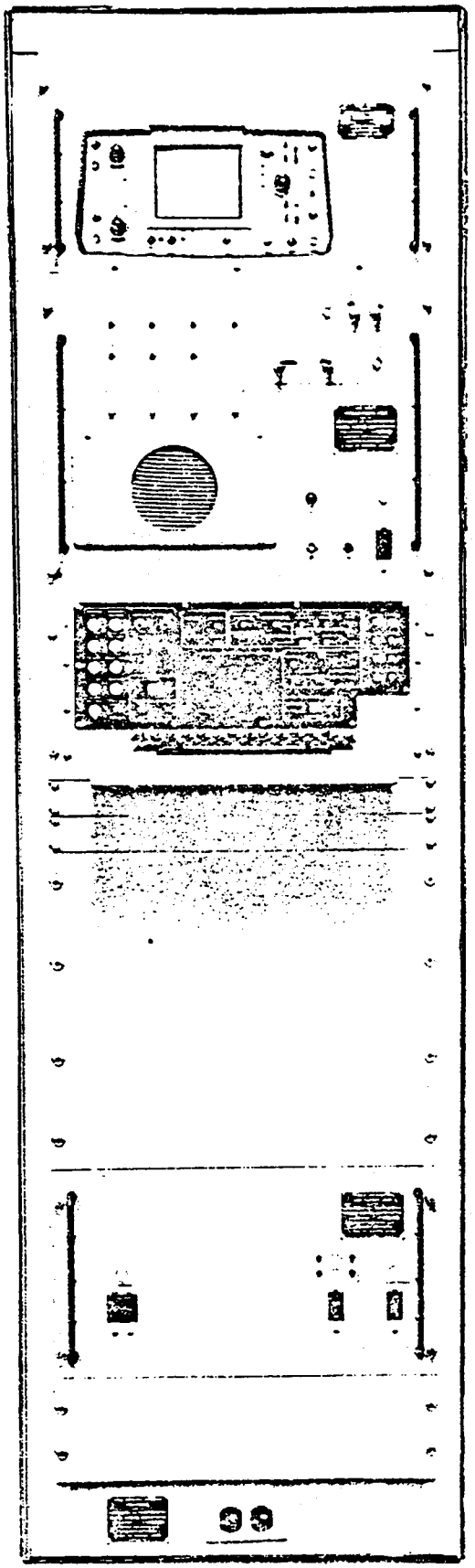


FIGURE 5-1. DME EQUIPMENT RACK UNIT 1 ASSEMBLIES

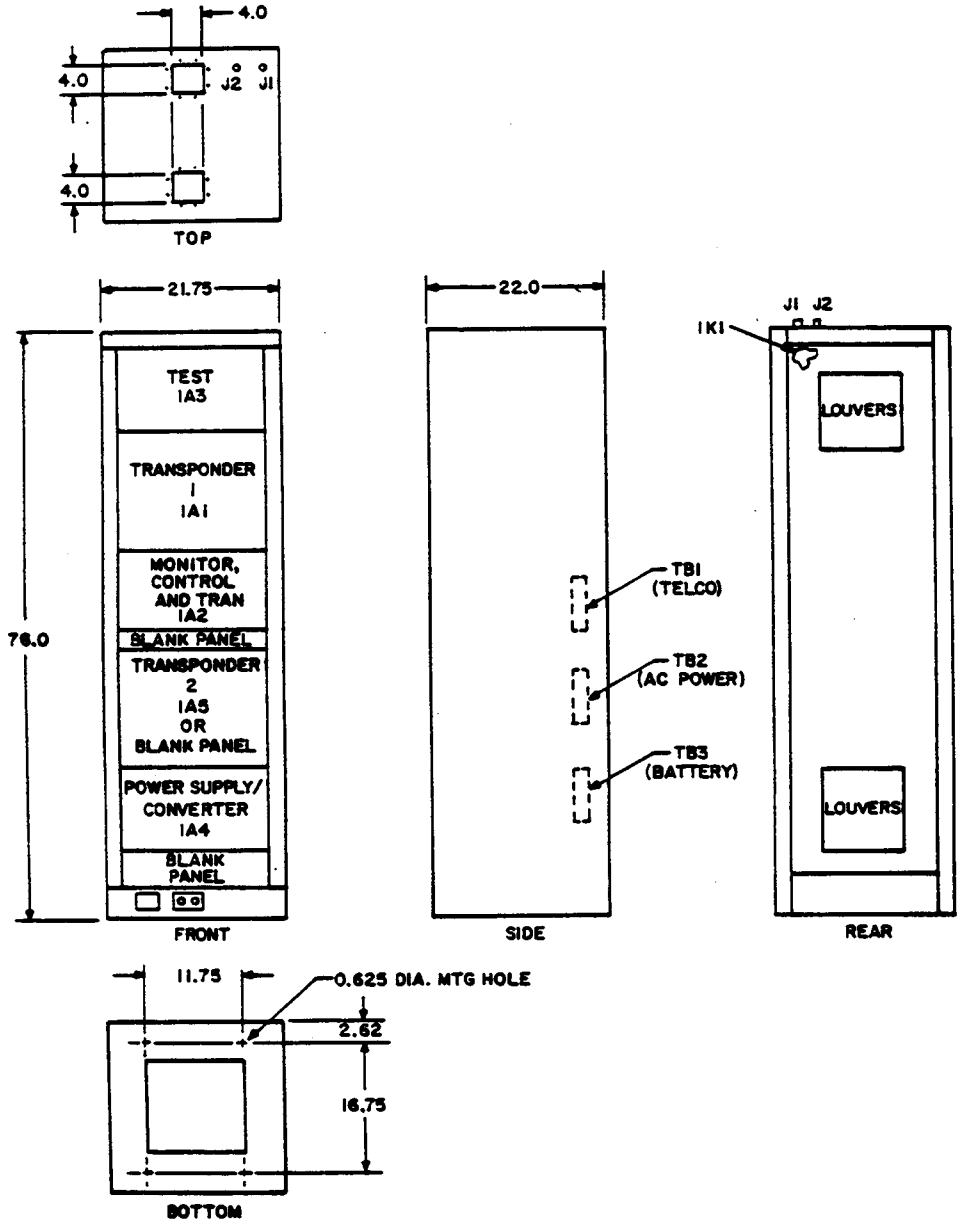


FIGURE 5-2. DME EQUIPMENT RACK, OUTLINE DIMENSION, AND INSTALLATION DETAILS

(2) Remove assemblies (units 1A and 1B) from shipping container 2 and carefully inspect the interior of each assembly for damage to cabling, connectors, and subassemblies.

(3) Remove the power supply (unit 1C) from shipping container 3 and inspect all components for any signs of damage.

(4) Remove the transponder(s) (unit 1D or units 1D1 and 1D2) from shipping container 4 and carefully inspect each assembly for any damage to cabling, connectors, and subassemblies.

NOTE: Do not roll the antenna; lift and carry it.

(5) Remove antenna (unit 2) and associated connectors from shipping container 5; place unit 2 on a clean, flat surface. Carefully inspect the antenna for damage to radome and to connectors.

33. RACK CABINET INSTALLATION.

a. Rack Type and Number. The standard equipment enclosure used for the DME is a rack cabinet type III, 76 inches high and 22 inches deep (see figure 5-2).

b. DME Rack Installation. The DME rack shall be installed in existing air navigation facilities adjoining existing equipment racks or it shall be freestanding (drawings D-6204-013, -016, and -021). The following general guidelines should be followed when installing the DME rack:

(1) The rack should be installed plumb, level, and square. Metal washers may be used as shims to compensate for floor irregularities.

(2) The adjoining equipment rack shall be closely aligned to permit the racks to be bolted together for greater stability.

(3) After proper leveling and alignment, the rack should be anchored to the floor, as described in paragraph 33c.

(4) Grounding the rack to floor reinforcing steel must be avoided.

(5) The adjoining equipment rack and the DME rack should be bolted together at four predrilled holes provided on each side of the rack. Racks should be connected with 0.25- by 1-inch bolts, flat washers, lockwashers, and nuts.

c. Anchoring of DME Rack.

(1) Where the DME rack is freestanding, it shall be anchored to the floor at all four corners at the 5/8-inch-diameter holes located

on the inside bottom of the cabinet. Where two racks are bolted together, two anchors in diagonal corners of each rack are sufficient.

(2) Several methods of anchoring the racks to the floor are available. The preferred method is to use lead caulking anchors set in concrete floors. When using lead anchors, it is necessary to drill an appropriate size hole of sufficient depth to accept the anchor. The anchor is then firmly seated in the holes and a screw or bolt is used to attach the rack to the anchor. Different floor constructions require different anchoring techniques. In the case of wood floors, use a lag bolt or very large wood screws. Toggle or molly bolts can sometimes be used on certain types of floors. The method of anchoring shall not present protrusions or sharp surfaces that may be hazardous to personnel.

34. INSTALLATION OF TEST OSCILLOSCOPE. To install the test oscilloscope, AN/USM-425(V)1 or government-furnished equivalent, proceed as follows:

NOTE: In the following procedures, all numbers within parentheses refer to item numbers in figure 8-3, page 8-5, of the Technical Manual for Oscilloscope (100-MHz Bandwidth) AN/USM-425(V)1; Air Force T.O. 33A1-13-496-1 (FAA TI6200.15).

a. Using a flat-blade screwdriver, turn all six latches (16) one-quarter turn counterclockwise. Lift scope cabinet top (2) away from the main frame.

b. Using a Phillips-head screwdriver, remove the nine screws securing the shield (22) to the main frame and remove shield.

c. Remove self-locking screw (12) from carrying handle by means of a 3/8-inch open-end wrench. Repeat procedure for both sides of the carrying handle. Remove carrying handle.

NOTE: Save any washers or ground springs loosened during this procedure; ensure that no hardware is allowed to drop into the main frame.

d. Replace all hardware removed in paragraph 34c onto the carrying handle for storage purposes.

e. Replace shield (22) by reversing the procedure of paragraph 34b.

f. Replace cabinet top (2) by reversing the procedure of paragraph 34a.

g. Unscrew and remove the four cabinet feet (24). Save for later use.

h. Place the oscilloscope in the space provided in the test assembly (unit 1B). Ensure that the four screws (mountings for the scope feet)

on the bottom of the main frame protrude through the slots provided in unit 1B.

i. Slide oscilloscope into the ac power receptacle provided at the rear of unit 1B. Ensure that any excess slack of the scope power cord does not interfere with cables from the test assembly or antenna switch.

35. OMNIDIRECTIONAL ANTENNA (UNIT 2) INSTALLATION. To install the omnidirectional antenna, proceed as follows (see figure 2-10 for outline dimensions):

NOTE: Before any work is performed above the counterpoise level, a facility shutdown must be arranged in accordance with standard FAA procedures.

a. For the DME antenna mast:

(1) Remove the DME antenna obstruction lights if the lights are not required.

(2) Carefully slide the antenna onto the folded-down mast.

(3) Secure the six bolts on the base of the antenna to fasten the antenna to the mast, then tighten the locknuts on the bolts.

b. For the 16-foot VOR antenna cone:

(1) Fabricate the 16-foot cone cover plate as specified in drawing D-6204-008.

(2) From the 16-foot cone, remove the tactical air navigation (TACAN) mounting fixture (including obstruction lights if installed).

(3) Remove the obstruction lights on the DME antenna.

(4) Carefully slide the antenna onto the VOR polarizer pedestal and orient the antenna for ease of cable connection to the antenna connectors.

(5) Secure the six bolts on the base of the antenna to fasten antenna to the pedestal, then tighten the locknuts on the bolts.

(6) Install the cover plate and caulk around the edges with DAP caulking compound or equivalent to prevent water ingress.

(7) Install the DME antenna obstruction lights (if required) on conduit extension fitted through the cone cover plate.

c. For the Wilcox VOR antenna cone:

(1) Fabricate the adaptor ring in accordance with drawing D-6204-007.

(2) From the Wilcox cone, remove the closure ring (and obstruction lights if installed) from the top of the radome.

(3) Install the adaptor ring on the top of the radome.

(4) Remove the DME antenna obstruction lights if the lights are not required.

(5) Carefully slide the antenna onto the adaptor ring and orient the antenna for ease of cable connection to the antenna connectors.

(6) Secure the six bolts to fasten the antenna to the adaptor ring, then tighten the locknuts on the bolts.

(7) Caulk as required with DAP caulking compound or equivalent to prevent water ingress into the antenna cone.

36. EXTERNAL CABLING INTERCONNECTIONS. (Refer to table 5-2.) Figure 5-3 is a system cabling diagram showing the DME equipment rack (unit 1) wiring connections to unit 1 assemblies and associated external equipment.

NOTE: If access to the rear of unit 1 is available, remove rear panel of the DME equipment rack to facilitate cabling.

a. Cable Installation. Perform the following procedure for routing the external cables from the DME equipment rack to the associated external equipment terminations. Figure 5-3 illustrates the installation of these cables through the top of the rack and shows the location of the terminal boards used for connections.

(1) Route external cabling through conduit or 4- by 4-inch square duct from the DME equipment rack to the associated external terminations.

(2) Route antenna cabling via the messenger cable to the antenna base.

(3) Route power cabling via the conduit or 4- by 4-inch square duct to the power panel.

b. Antenna Cable Assembly. Refer to cabling diagram of figure 5-3 for correct connections.

(1) Remove the service cover of the antenna base adaptor.

TABLE 5-2. EQUIPMENT AND ACCESSORIES REQUIRED

Quantity	Nomenclature	FAA Type
1	Equipment Rack, Unit 1	FA-9783
1	Monitor and Control Assembly, Unit 1A2	FA-9783/4
1	Test Assembly, Unit 1A3	FA-9783/1
1	Power Supply, Unit 1A4	FA-9783/5
1 (2)	Transponder(s), Unit 1A1, Unit 1A5 (optional)	FA-9783/2 FA-9783/3
1	Omnidirectional Antenna, Unit 2	FA-9783/6
5	RG-58/U BNC Test Cables	
2	RG-58/U BNC and Pin Test Cables	
1	N-to-BNC Adaptor	
1	BNC T-Connector	
2	Type N Cable Connectors for RG-214/U Monitor Probe Cable	
2	Type N Cable Connectors for RG-214/U Antenna Cable	
1	Multipin Connector for AC Power Connection to Antenna	

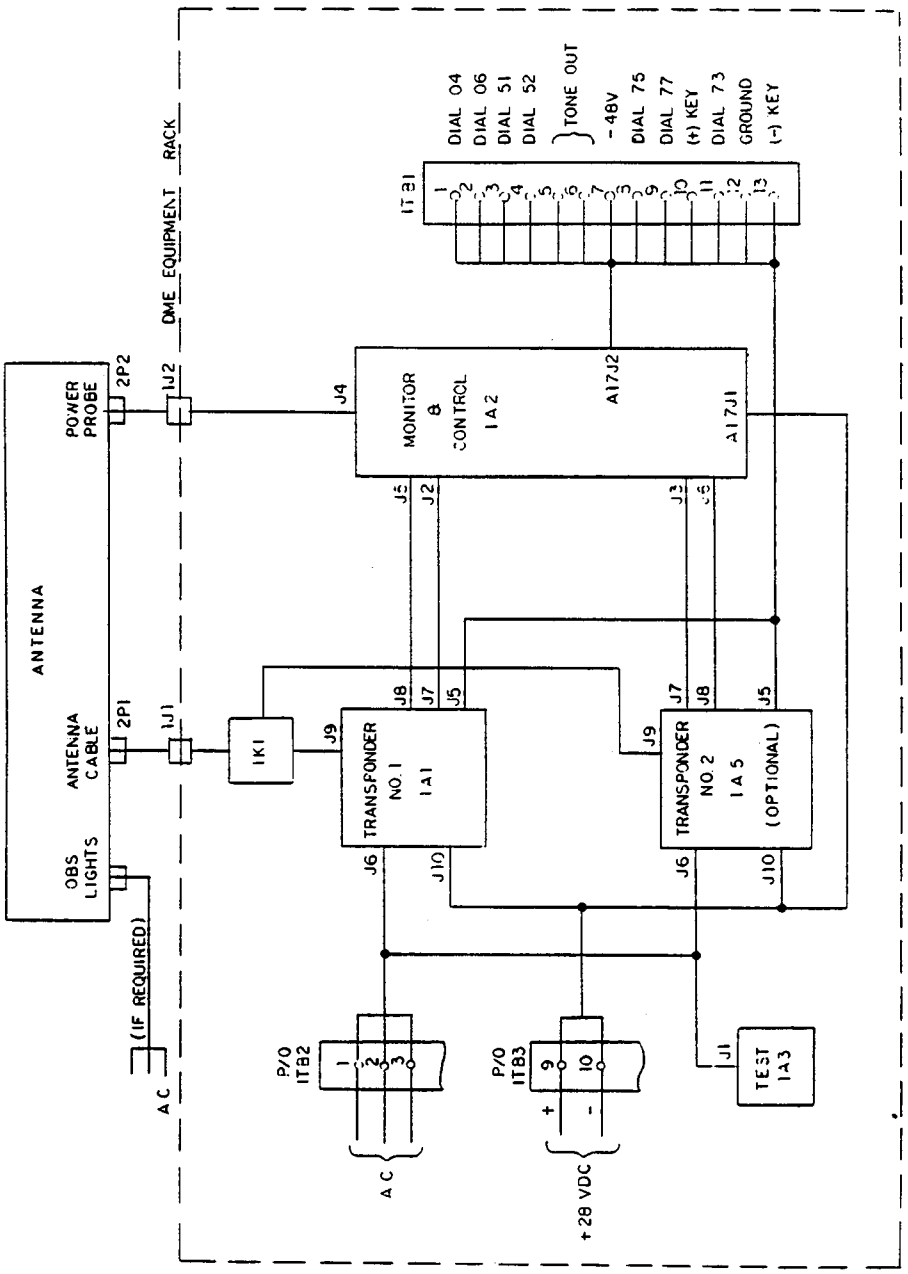


FIGURE 5-3. DME CABLING CONNECTIONS

(2) If obstruction lights are required, cut the three-conductor power cord to the appropriate length for direct connection to the antenna and attach the multipin connector MS3106E-16-IOS. (See figure 5-4 for details.)

(3) Cut the RG-214/U antenna cable to the appropriate length for direct connection to the antenna and attach a type N connector to each end. (See figure 5-5 for details.)

NOTE: The extension cable provided is not used.

(4) Cut the RG-214/U monitor cable to the appropriate length for direct connection to the antenna and attach a type N connector to each end. (See figure 5-5 for details.)

(5) Feed the antenna cables through the opening provided and connect each cable to the appropriate antenna connector.

(6) Replace the service cover of the antenna base adaptor.

c. Equipment Rack Cable Assembly. Refer to the cabling diagram of figure 5-3 for correct connections. When cables are properly routed to the equipment rack:

(1) Attach the antenna cable to 1J1.

(2) Attach the monitor cable to 1J2.

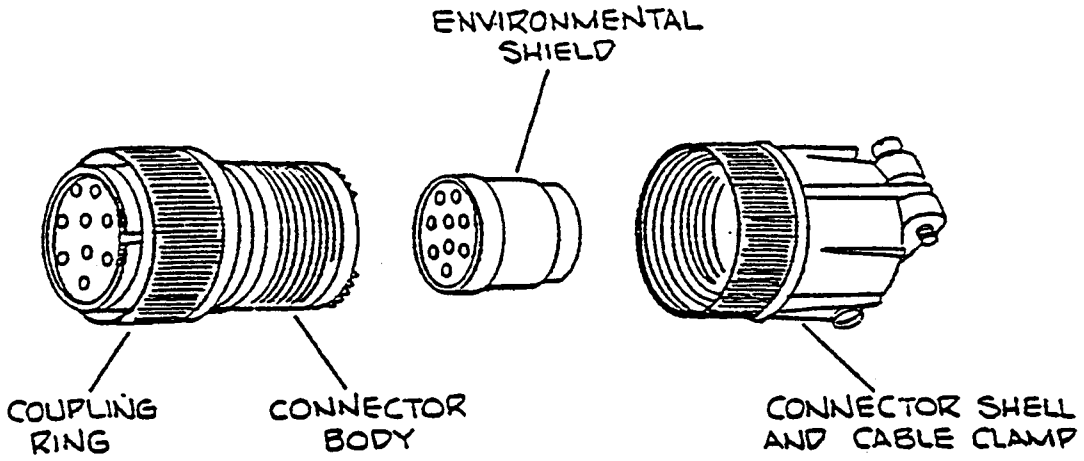
37. INSTALLATION OF UNIT 1 ASSEMBLIES. This section outlines procedures for installation of the test assembly, the monitor and control assembly, the transponder(s), and the power supply into the equipment rack (unit 1). See figures 5-6 through 5-9 for rear connections to these units.

NOTE: If access to the rear of unit 1 is available, remove the rear panel of the equipment rack to facilitate cable connection.

a. The test assembly (unit 1A) is installed as follows:

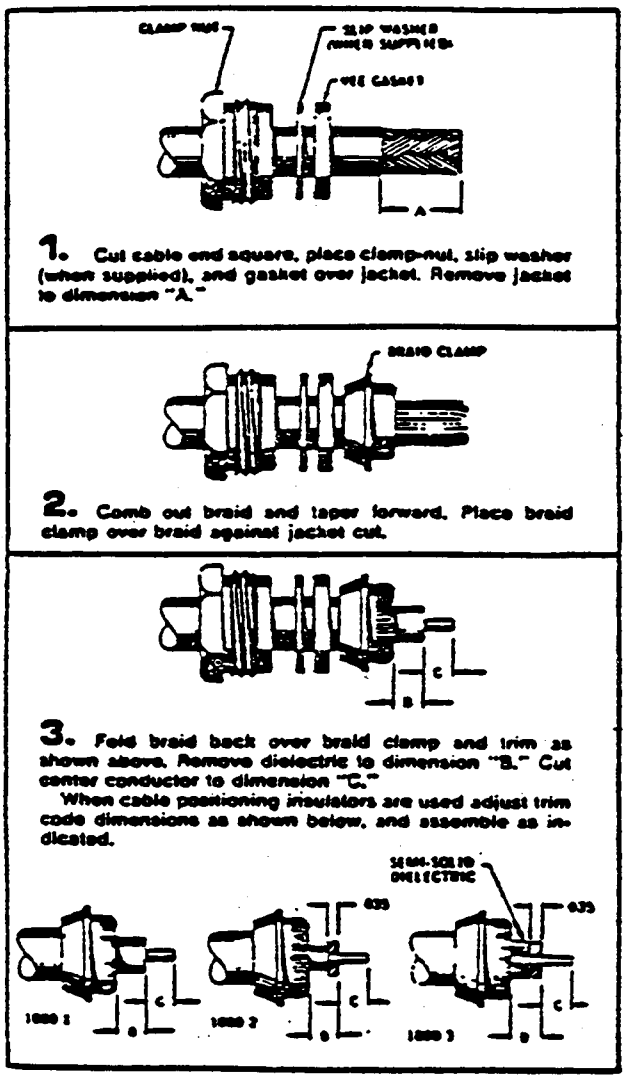
(1) Pull out the topmost slides of the equipment rack to the fully extended, locked position.

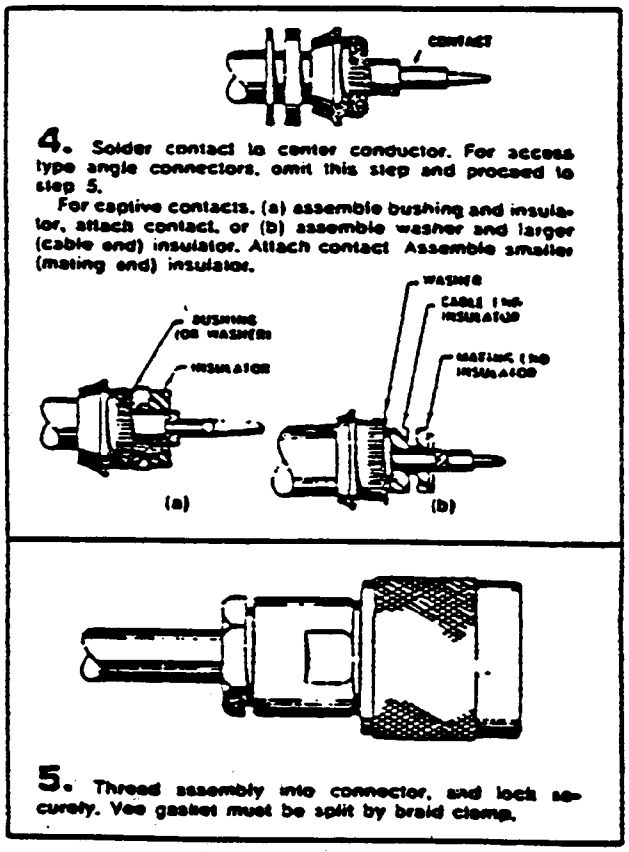
(2) On test 1A3, align the drawer slides with the slides in the equipment rack and push 1A3 into the rack until the first stop is reached.



1. Unscrew connector shell and cable clamp from the connector body.
2. Remove environmental shield.
3. Prepare power cord by stripping wires (approximately 1/4 inch) and tinning ends.
4. Push wires through connector shell and cable clamp, through environmental shield, and solder to contact sockets provided. Where possible, the use of plastic tubing on each wire is recommended.
5. Seat environmental shield firmly against connector body and replace connector shell and cable clamp.
6. Secure cable clamp.

FIGURE 5-4. PROCEDURE FOR ATTACHING CONNECTOR MS3106E-16-IOS TO CABLE





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3/8	.046	7/32

FIGURE 5-5. PROCEDURE FOR ATTACHING TYPE N CONNECTORS M39012/1-0005 TO CABLE

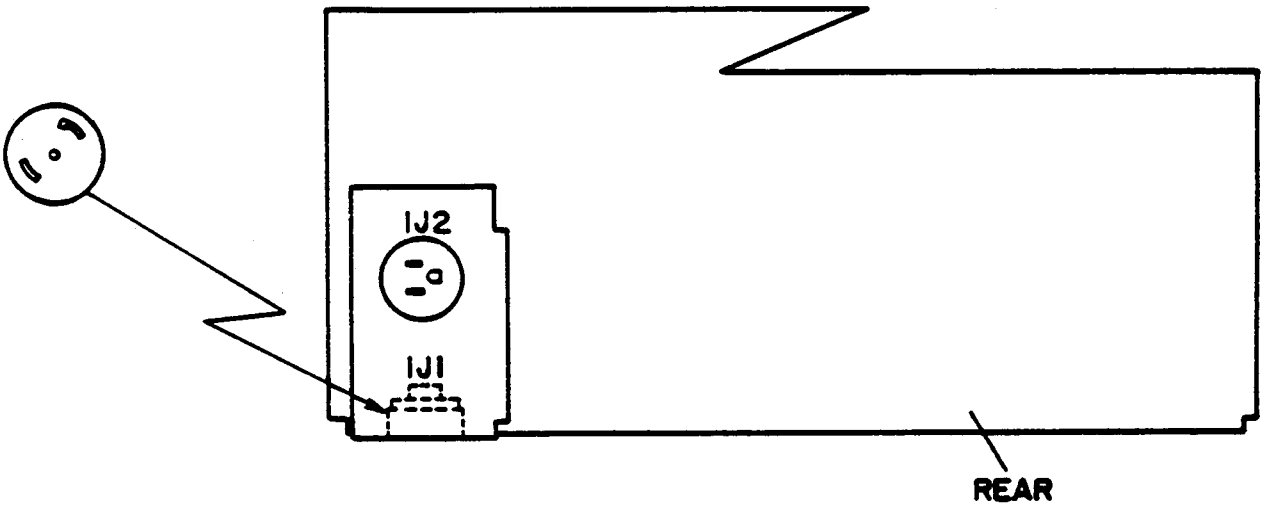


FIGURE 5-6. TEST ASSEMBLY REAR CONNECTIONS

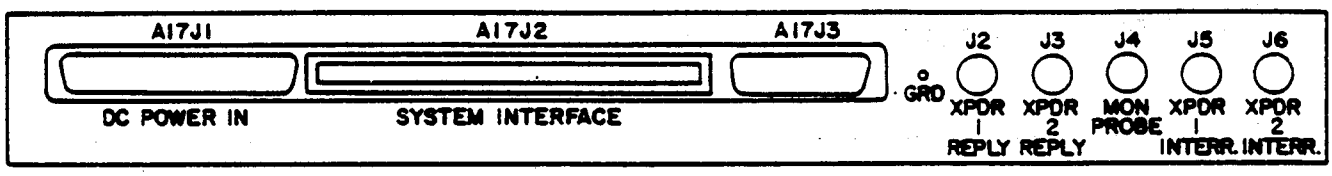


FIGURE 5-7. MONITOR AND CONTROL ASSEMBLY REAR CONNECTONS

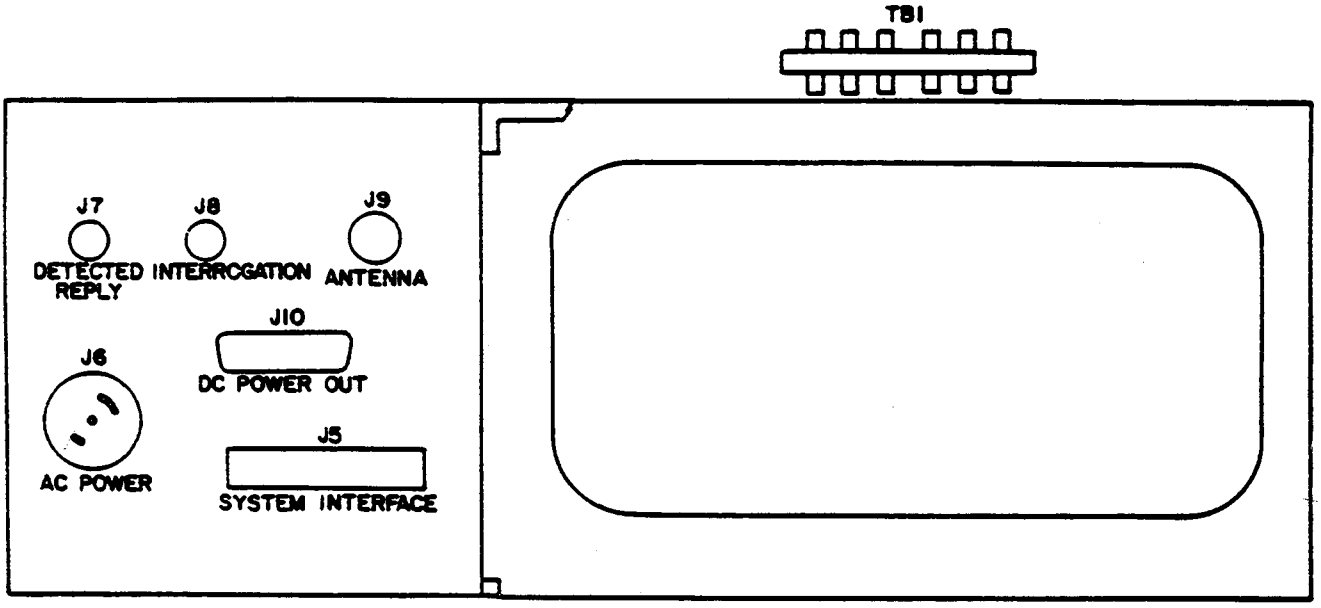


FIGURE 5-8. TRANSPONDER ASSEMBLY REAR CONNECTIONS

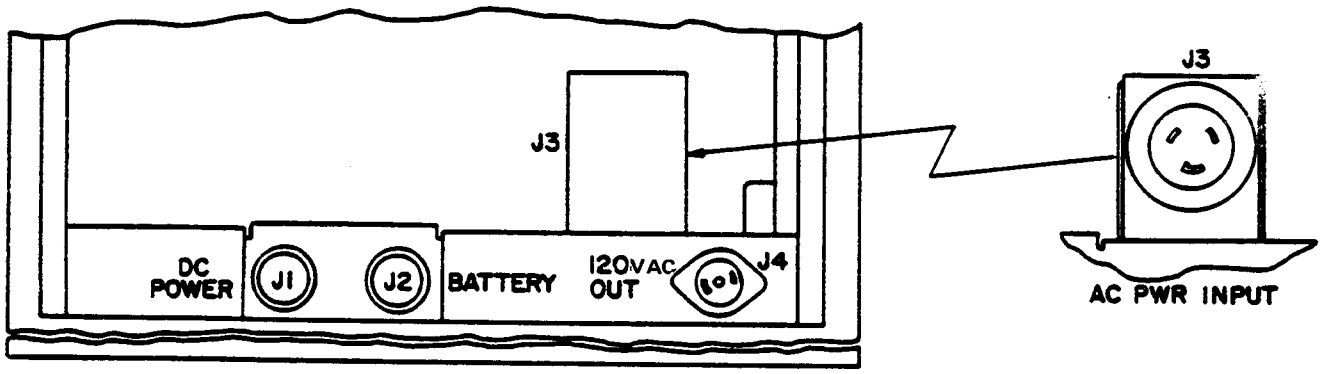


FIGURE 5-9. POWER SUPPLY REAR CONNECTIONS

(3) Depress the metal buttons on the drawer slides and push test 1A3 farther into the rack until the second stop is reached (this is the service position).

(4) Depress the metal buttons on the drawer slide and push completely into the equipment rack.

(5) Secure test 1A3 into place by using the four captive screws on the front panel.

b. The monitor and control assembly is installed as follows:

(1) Slide monitor, control, and transfer 1A2 into the rack on the third set of slides from the top in the same manner as used for test 1A3.

(2) Secure assembly 1A2 in place by using the four captive screws on the front panel.

c. The transponder is installed as follows:

(1) Slide transponder 1A1 into the rack on the second set of slides from the top in the same manner as used for test 1A3.

(2) Secure transponder 1A1 into place by using the four captive screws on the front panel.

NOTE: If a second transponder is to be installed, the same procedures shall be followed except that the second transponder assembly will be installed just above the power supply (figure 5-1).

d. The power supply is installed as follows:

(1) Slide the power supply/converter into the rack on the bottom set of slides in the same manner as used for test 1A3.

(2) Secure the power supply/converter into place by using the four captive screws on the front panel.

(3) Locate, within the wiring harness, the three-prong ac power connector, P/N 406073, and connect to matching connector J3 on 1A4.

(4) Transformer 1A4T1 is factory connected for 120 V ac operation.

NOTE: Even if the batteries are not used, the battery cable must be connected to the equipment rack terminal board TB3, and the two jumpers on 1A4A1 must be in the Lead-Acid position, J5 to J7 and J2 to J4.

SECTION 2. WIRING AND CABLING

38. ELECTRICAL WIRING. Power wiring in DME facilities shall conform to the latest edition of specification FAA-C-1217, Interior Electrical Work, and to the NEC. All ac receptacles and equipment conductors shall be of the three-wire grounding type. Other general requirements are:

a. Ducts and Conduits. All electrical wires from the circuit breaker panel to equipment cabinets shall be protected in approved ducts or conduits. At junction points of conduit-to-duct or conduit-to-electrical outlet boxes, bushings shall be installed to protect wires from physical damage. On cable tray systems, dividers shall be provided if power and radio signaling conductors share the cable tray. Outside electrical installations shall use moistureproof conduits and fittings.

b. Electrical Conductors.

(1) Single-conductor wiring protected in ducts or conduits shall be thermoplastic-covered wire, type THW or THWN. The wire size is determined by the current flow of the circuit. The DME type FA-9783 is protected with a 50-A breaker for a 1000-W DME or a 30-A breaker for a 100-W DME and, in accordance with the NEC, requires the use of American Wire Gage (AWG) 6 or larger diameter wire for a 1000-W DME, or 10 or larger diameter wire for a 100-W DME.

(2) Any wire splices shall be made with approved splicing connectors and be in accessible areas such as junction boxes and square ducts with covers.

c. Color of Wires.

(1) AC electrical wires, either single-conductor or three-wire cord types, shall be color coded as follows:

(a) White - neutral.

(b) Green - ground.

(c) Black - 115 V ac (line A).

(d) Red - 115 V ac (line B).

(e) Every other voltage will use separate color wire.

(2) Wires may be wrapped with colored tape at the exposed areas to conform to the color code above.

d. Receptacle Wiring. Most of the branch circuit wiring will terminate at equipment rack receptacles or to plug-in strips. The receptacles shall be of the three-wire type with proper identification of HOT, NEUTRAL, and GROUND terminals. AC strips are usually wired in the field so that they can be made adaptable to the electrical needs of the rack. The DME convenience outlet requires a 15-A circuit breaker.

39. SYSTEM WIRING.

a. Wiring and cabling between the ac power distribution panel in the facility building or shelter and the DME equipment or the DME antenna shall be installed to meet the present circuit demands (refer to paragraph 38b(1)).

b. Cable Installation. The existing 4- by 4-inch square duct in the facilities shall be used (if possible) for cable runs between the DME rack and the ac power distribution panel or the antenna access. Cables shall be installed in the duct in a systematic order with as few crossovers as possible. Where the number of cables requires stacking, the cables traveling the farthest shall be on the bottom of the stack. The first run of cables shall be secured to the tray at regular intervals using lacing cord or plastic tie-wraps (such as PAN-TY cable ties). Second, third, and succeeding stacks of cables are tied to those below. If signal/control cable runs share a common duct with power cables, signal/control cables shall be isolated from power cables by a metal barrier or reinstalled in a separate duct. At DME/ILS facilities, 3/4-inch thin-wall conduit shall be installed for routing the power cable and 1 1/2-inch thin-wall conduit shall be installed for routing the antenna rf cables.

c. Dressing of Cables. Dressing of cables includes arranging them in a systematic order, removing the outer covering and inner insulation on individual pairs, and otherwise preparing them for connection to blocks or equipment connectors. It is very important that the cable dressing be carried out in a uniform manner throughout the installation, and that the general appearance is pleasing to the eye. Cables extending into racks shall be arranged in the order of their use, with those connected to the lowest part of the rack installed first and secured to the side wall of the rack. Other cables will be tied on top and tied to those below. The cover of cables and their inner insulation are to be removed at the point which allows ample room for splitting the wires before they enter the terminal block or connector. The foil around shielded pairs is removed at the cable opening point and the drain wires either removed or continued to the connector point.

d. Terminating Wires. Cable connections should be made only at terminal strips or in junction boxes. Cable lengths up to 1000 feet should be continuous in length (no splices). After dressing of the cables is completed to the intended terminating point, the individual cable pairs are separated. Actual terminating techniques depend on the type of connector or block being wired. However, on all installations some slack shall be left in the terminal wire. It is apparent that termination of the facility wiring is probably the most important operation of the installation and must be carried out professionally. The care and attention exercised on this phase will pay off when the equipment is placed in operation and when the facility is inspected periodically.

e. Insulation. When removing insulation from wires, insulation stripping devices that nick, mar, or damage the conductor in any way should not be used. Good quality cable strippers should be used. The correct setting (size) of the stripping tool should be based on the size of the wire. Proper use of cable strippers will ensure that the wire is not nicked, a condition which could later cause breaks. Strip only the insulation necessary to make the connection.

f. Solderless Lugs. When using solderless lugs, the size and type of wire must be considered so the proper lug can be used. Lugs are color coded for wire size. Red lugs are for No. 22 through No. 16 size wire, blue lugs are for No. 16 through No. 14 size wire, and yellow lugs are for No. 12 through No. 10 size wire. Also, lugs must be selected for the size of the screw. The lugs most frequently used are spade lugs that fit a No. 6 screw and are sized to accept either wire sizes of 14 through 16 or 16 through 22. All lugs used are insulated; therefore, no insulation need be installed. Special crimping tools are provided for installation of lugs. Proper use of these tools is imperative for a good electrical connection. All stranded wire requires the use of lugs. Stranded wire shall not be installed under a binding post without the use of a lug.

g. Plastic Tubing. When soldering wires to cable plugs, lengths of spaghetti (plastic tubing) shall be used over each wire and connection point. This will ensure to the maximum that shorts are prevented. A cable clamp is to be used on all plugs to avoid strain on the cable connections and to avoid twisting.

h. Equipment-to-Equipment Connections. In a number of cases, direct equipment-to-equipment connections are required. They are generally of two types. In one type, a fixed length of cable with suitable connectors at either end is factory made and supplied complete with grounding connections. It is desirable to use them as supplied unless the length is insufficient. In the other type, only the equipment connectors are provided, and the cable must be fabricated at the site using the required length of the appropriate type of cable. Care should be taken to use only the specified type of cable with proper shielding and grounding drain connections where necessary. These cables need not be routed through cable ducts and trays unless they span several racks or consoles.

i. Handling of Shields. Cables having shielded pairs shall have their shield grounded at the equipment end only. Shielded pairs normally have an aluminum foil wrapping with a bare wire (drain wire) under the foil. In such cases, only the drain wire is connected to ground. The best installation is achieved by removing the foil from all the cable pairs at the same point and then twisting their drain wires together to form a braid. All the drain wires can then be lugged together and attached to the insulated grounding bus.

j. Marking Cables. All cables should be tagged at each end for easy identification. Positioning of markers or labels should permit easy access without disturbing adjacent wiring and cabling. The markers used for this purpose should be of a type that is both durable and easy to install (such as PAN-TY markers). In all cases, markers should be installed in accordance with the manufacturer's recommendations.

k. Clamping Cables. Cables should be supported adjacent to connectors by a cable clamp of appropriate size to prevent pulling on the connector. The distance between the cable clamp and connector should be such that the connector can be easily removed and reattached to its mating unit while minimizing loading on the connector.

l. Wiring Checkout. Every connection made during an installation shall be verified both for unintended grounding and circuit continuity before energizing the system. Unintended grounding shall be tested with a low-voltage megger or a multimeter set to a high-resistance scale. The resistance between ground and the wire shall be nominally infinite. Continuity testing shall be accomplished by setting the multimeter on a low-resistance scale. One end of the wire is connected to a common wire (ground wire). The resistance between the other end of test wire and common wire is measured. Continuity is established when this resistance is nominally zero. When testing equipment plug wiring, the adjacent terminals to the connection being checked shall be tested for possible shorts caused by the cramped wiring in the connector housing.

40. INSIDE CABLE DUCTS.

a. General.

(1) A wide variety of methods for distributing interconnect cables and wiring are presently in use throughout the FAA. These methods include the following:

(a) Cabinet-top, open-type racks.

(b) Cabinet-top, enclosed ducts/trays (commercial and fabricated).

(c) Raised computer floor.

(2) In DME installations, the cable distribution method for the facilities shall be via the existing 4- by 4-inch square duct or via newly installed conduit at ILS facilities.

b. DME 4- by 4-Inch Cable Ducts. The following guidelines shall be used in modifying or installing sections of the 4- by 4-inch ducts.

(1) Ducts procured from commercial sources should not have knockouts.

(2) Ducts procured from commercial sources should be assembled and installed using matching hardware and shall be electrically continuous.

(3) Fabricated ducts should be assembled and installed using properly selected hardware and shall be electrically continuous.

(4) Where cutting is required, the workmanship should be such that all edges are smooth, aligned, and fit well.

(5) Surfaces of duct work should be level, plumb, and square.

(6) Duct work shall be grounded throughout its length using bare copper No. 6 AWG wire. The ground wire shall be attached to each section of the duct work (exclusive of couplings) and mechanically fastened to clean metal with copper or bronze Blackburn LB-70 or equivalent connectors. The ground wire should be continuous to its termination at the building ground, but need not necessarily be a single piece.

c. Thin-Wall Conduit. The following guidelines shall be used in installing thin-wall conduit:

(1) Conduit procured from commercial sources should be assembled and installed using matching hardware and shall be electrically continuous.

(2) Where cutting is required, the workmanship should be such that all edges are smooth, aligned, and fit well.

d. PVC Conduit. The following guidelines shall be used in installing polyvinyl chloride (pvc) conduit:

(1) Conduit procured from commercial sources should be assembled and installed using matching hardware. Install pvc conduit in accordance with the NEC.

(2) Where cutting is required, the workmanship should ensure that all edges are smooth, aligned, and fit well.

SECTION 3. GROUNDING, BONDING, AND SHIELDING

41. GROUNDING.

a. General. Electronic circuits shall be grounded to minimize interference levels and hazards to personnel. Ensure that grounding of the electronic circuits does not interfere with other new or existing grounding systems or equipment in the facility.

b. Requirements of a Satisfactory Grounding System. A satisfactory grounding electrode system must always be available at the facility in which the equipment is to be installed. The grounding conductors to the equipment being installed must provide a low-resistance path to the grounding electrode system for the electronic grounding system and a low-impedance path to the earth electrode system for the equipment grounding (ac power) conductor. Installation of the electronic grounding system for the facility and the equipment shall be in accordance with the latest editions of Orders 6950.19, Practices and Procedures for Lightning Protection, Grounding, Bonding, and Shielding Implementation; 6950.20, Fundamental Considerations of Lightning Protection, Grounding, Bonding, and Shielding; standard FAA-STD-019, Lightning Protection, Grounding, Bonding, and Shielding Requirements for Facilities; and standard FAA-STD-020. Install the facility and equipment grounding conductors in accordance with Orders 6950.19 and 6950.20, standards FAA-STD-019 and -020, and the applicable requirements of Article 250, Grounding, of the NEC. A grounding system as defined in Orders 6950.19 and 6950.20 and standards FAA-STD-019 and -020 shall also be installed where required for the grounding of lightning surge and transient protection.

(1) Electronic Grounding Systems. Electronic grounding systems shall be compatible with new and existing equipment. Single-point (signal reference) grounding systems shall be isolated from all other grounding systems except at the tie to the earth electrode system. Multipoint grounding systems shall be bonded to structural members of the equipment housings, the facility, conduits, cable trays, etc., to provide as many ground paths in parallel as feasible to the earth electrode system. Do not substitute any of the electronic grounding systems for the equipment grounding conductor of the ac power system.

(a) Single-Point (Signal Reference) Grounding. This system requires an insulated bus in the equipment as the common ground which will be the low-resistance reference point or plane in the piece of equipment. Design practices and techniques must be such that the signal reference point of the equipment can be properly interfaced with other equipment, new or existing, without compromising the grounding system. The insulated reference plane must be copper bus or plate suitable for termination of cable shields and for connecting the signal ground of the equipment to the signal reference network of the facility. The shields of the data, signal, and control cables

will be terminated on the isolated signal reference bus, keeping the pigtails of the shields as short as possible. The insulated bus will be connected to the earth electrode system with a copper conductor insulated with a green jacket having a yellow tracer (stripe). This conductor shall be isolated from any other grounding system throughout its entire run to the earth electrode system connection. Where protection of this conductor is necessary, pvc conduit shall be used. Where the connection of the signal reference ground conductor to the earth electrode system is made at the grounding electrode conductor on the ac main service disconnect means, a suitable connector must be used. This connector type must not change the characteristics of the grounding electrode conductor so that it is no longer a continuous conductor without a splice in its run to the earth electrode system.

(b) Multipoint Grounding System. Connect multipoint grounding systems to the equipment frames, cabinets, racks, etc., to the conduits, wireways, cable trays, structural steel members, etc., and to the conductors used to make all of the interconnections. The multipoint grounding system shall provide multiple low-resistance paths between the various parts of the facility, between the items of equipment within the facility, and between any points within the system and the earth electrode system in order to minimize the effects of noise currents that may be present in the grounding system. The multipoint system grounding conductors shall be copper with green insulation and an orange tracer.

(c) Installation of Electronic Grounding Systems Conductors. Guidance for the installation of the grounding conductors for the electronic systems, including size, method of termination, installation, etc., is given in FAA-STD-019, paragraphs 6 and 7.

(2) Equipment Grounding Conductor. The equipment grounding conductor must be copper with green insulation and shall be installed in the same raceway as the branch circuit conductors feeding the equipment. If a power cord is used, the green conductor must be integral with the phase conductors of the cord. The conductor shall be terminated on the equipment case utilizing approved fittings. Where a power cord terminates on a grounding-type attachment plug, the equipment grounding conductor of the cord shall terminate on a fixed ground contact of the plug. For equipment supplied through a connector, the connector shall contain a grounding pin terminating the equipment grounding conductor, which is integral with the other conductors, to the connector. Do not substitute conduits or cable shields, even when they would be electrically continuous and firmly bonded to the equipment cases, as the equipment grounding conductor. The equipment grounding conductor shall be sized in accordance with table 250-95 of the NEC.

(3) Surge and Transient Protection Grounding. All equipment signal landlines and the ac power feeders entering or leaving the facility shall be protected against lightning-induced surges entering the facility on these lines. The grounding system is a vital part of this protection and shall be installed to meet the following:

(a) Landlines protected by surge devices, which shunt the overcurrent flow to the earth grounding system while clamping the voltage and energy below the equipment susceptability level, shall be grounded in such a manner that the low-energy (triggering) devices are solidly bonded to the equipment grounding conductor and the high-energy devices are connected to the earth electrode system in a short and direct path. Bends shall be kept to a minimum and sharp kinks are not permitted. The conductor shall be No. 6 AWG copper. The ground connections to the high-energy devices shall be isolated from all equipment cases, cabinets, other ground systems, etc., until the connection is made to the earth electrode system, either at the system itself or to a copper conductor connected to the earth electrode system. If the connection is made at the latter point, this shall be at a point where the conductor to the earth electrode system exits the building.

(b) Cables with shield or armor over the conductors shall have the shield or armor firmly connected at the building interface to the nearest suitable grounding system. This excludes any single-point (signal reference) grounding system. A connection readily available to the earth grounding system is preferred.

(c) Coaxial cables entering the facility shall be terminated on a metal bulkhead plate, compatible with the cable connectors, where the cables first enter the facility. The bulkhead plates, coaxial connectors to the plate, and the grounding of the plates shall be in accordance with FAA-STD-019, paragraph 3.8.7.2.

(4) Grounding Conductors. All ground wires, straps, bonds, and jumpers shall be without splices or joints.

42. BONDING.

a. General. High-quality bonding between conducting elements throughout the facility is essential to the effective functioning of all grounding and shielding applications.

b. Requirements. All bonding installations shall be accomplished in such a manner that joints, connections, and interfaces will be suitable and proper for the system. Bonds shall be installed as defined in this section and in accordance with the applicable parts of FAA-STD-019, paragraph 9. Connections to equipment shall also follow FAA-STD-020. Bonding of the ac power systems shall be in accordance with the applicable requirements of the NEC. All dc resistance tests shall be accomplished with a four-terminal milliohmmeter.

c. Methods. Bonds may be made by welding or by using Underwriter's Laboratories, Inc., (UL) approved connectors. The connectors shall be of the bolted or clamp type. Where bolted types are used, the surface contact area on flat surfaces shall be 3 square inches (545 square millimeters) or greater. Soft soldering or brazing shall not be used for any part of the lightning or surge protection system or in the ac power or multipoint ground systems. Soft solder shall only be used to improve conductivity at load-bearing joints and shall not be used to provide mechanical restraint.

(1) Welding. Welding shall be in accordance with FAA-STD-019, paragraph 9.4.

(2) Bolted Connections. Bolted connections are used primarily as mechanical fasteners for holding the component members of the bond in place. The connector bolts must be tightened enough to maintain the contact pressure required for effective bonding, but not overtightened. FAA-STD-019, table 2-6, provides the minimum torque guidance for the various bolt sizes of bolted connectors. Do not use bolts as direct bonds for high-frequency signals. Additional guidance for the use of bolted connections is given in FAA-STD-019, paragraph 9.6.

(3) Rivets. Use rivets primarily as mechanical fasteners to hold two smooth, clean metal surfaces together or to provide a mechanical load-bearing capability to a soldered bond. Do not use rivets as indirect bonds for high-frequency signals. Riveted joints are adequate for personnel shock hazard protection provided the resistance does not exceed 0.1 milliohm.

(4) Sheet Metal Screws. Sheet metal screws may not be used to provide a continuous and permanent electrical bond. They shall be used only to secure protective covers.

(5) Bonding Straps and Jumpers. Bonding straps, including jumpers, shall be in accordance with FAA-STD-019, paragraph 9.7.

d. Surface Preparation. All mating surfaces which compose a bond shall be thoroughly cleaned before joining in accordance with FAA-STD-019, paragraph 9.13.

e. Dissimilar Metals. Coupling of dissimilar metals shall be in accordance with FAA-STD-019, paragraph 9.12.

f. Fasteners. Fastener materials for bonding aluminum and copper jumpers shall conform to the materials listed in table 5-3.

g. Completion of the Bond. If an intentional protective coating is removed from the metal surface, the mating surfaces shall be joined within 4 hours after cleaning.

TABLE 5-3. METAL CONNECTIONS FOR ALUMINUM AND COPPER JUMPERS

Metal Structure (Outer Finish Metal)	Connection for Aluminum Jumper	Screw Type 1/	Connection for Tinned Copper Jumper	Screw Type 1/
Magnesium and Magnesium Alloys	Direct or Magnesium Washer	I	Aluminum or Magnesium Washer	I
Zinc, Cadmium, Aluminum, and Aluminum Alloys	Direct	I	Aluminum Washer	I
Steel (except stainless steel)	Direct	I	Direct	I
Tin, Lead, and Tin-Lead Solders	Direct	I	Direct	I or II
Copper and Copper Alloys	Tin- or Cadmium-Plated Washer	I or II	Direct	I or II
Nickel and Nickel Alloys	Tin- or Cadmium-Plated Washer	I or II	Direct	I or II
Stainless Steel	Tin- or Cadmium-Plated Washer	I or II	Direct	I or II
Silver, Gold, and Precious Metals	Tin- or Cadmium-Plated Washer	I or II	Direct	I or II

1/ Type I - Cadmium, zinc plated, or aluminum.
Type II - Passivated stainless steel.

h. Refinishing of Bonds. Bonds shall be refinished so as to match the existing finish, depending upon the protective requirements.

i. Bond Protection. All bonds shall be suitably protected against weather, corrosive atmospheres, and mechanical damage. Under dry conditions, a corrosion preventive or sealant shall be applied within 24 hours after bonding. Under highly humid conditions, sealing of the bond shall be accomplished within 1 hour after bonding.

(1) Paint. If a painted finish is required on the final assembly, the bond shall be sealed with the recommended paint. Care shall be taken to ensure that moisture or other contaminants may not enter the bond. A waterproof paint or primer conforming to the latest edition of standard FAA-STD-012, Paint Systems for Equipment, shall be used if the recommended finish is not waterproof.

(2) Inaccessible Locations. Areas not reasonably accessible for maintenance shall be sealed with permanent, waterproof compounds.

(3) Accessible Locations. If a painted finish is not required after assembly of a bond, a silicone- or petroleum-based sealant shall be applied.

(4) Compression Bonds in Protected Areas. Compression bonds between copper conductors or between compatible aluminum alloys and located in readily accessible areas not subject to weather exposure, corrosive fumes, or excessive dust shall not require sealing, subject to the approval of the contracting officer (CO).

j. Bond Resistance. Unless otherwise specified in the contract documents, all bonds shall exhibit a maximum dc resistance of 1 milliohm as measured between the bonded members with a four-terminal milliohmmeter.

43. SHIELDING.

a. General. Protective shields for personnel, shielding to attenuate radiated signals, and the spatial separation of equipment and conductors shall be incorporated into the facility to minimize the coupling of interference. Under normal operating and environmental conditions, the bonding and grounding of metal structural components, the building elements, and the spatial separation of certain conductors and equipment discussed in this section and FAA-STD-019, paragraph 10, are adequate.

b. Conductor and Cable Shielding. Conductor and cable shielding shall comply with the following:

(1) Signal Lines and Cables. Signal lines shall be twisted, shielded pairs with the shield insulated. Cables consisting of multiple twisted pairs shall have the individual shields isolated from each other. Cables with an overall shield shall have the shield insulated.

(2) Terminations of Individual Shields. Shielding on pairs of conductors and the shielding on cables containing unshielded conductors shall be terminated in accordance with the following:

(a) The shield shall be terminated at one end only. The length of unshielded conductors shall not exceed 1 inch (25 millimeters (mm)). To meet this requirement, the length of the shield pigtail may be longer than 1 inch, if necessary, to reach ground. The pigtail, however, shall be kept to a minimum length.

(b) Shield terminations shall employ minimum length pigtails between the shield and the connection to the bonding halo or ferrule ring, and between the halo or ferrule ring and the shield pin on the connector. The unshielded length of the signal line shall not exceed 1 inch (25 mm) with not more than 1/2 inch (13 mm) exposed length as the desired goal.

(c) Shields, individually and collectively, shall be isolated from overall shields of cable bundles and from equipment cases, racks, cabinets, junction boxes, conduits, cable trays, and elements of the multipoint ground system. Except for one interconnection, individual shields shall be isolated from each other. Care shall be exercised to ensure that this isolation is maintained in junction boxes, patch panels, and distribution boxes throughout the cable run. When a signal line is interrupted, such as in a junction box, the shield shall be carried through. The length of unshielded conductors shall not exceed 1 inch (25 mm). To meet this requirement, the length of shield pigtail may be longer than 1 inch, but shall be kept to the minimum possible length.

(d) Nothing in this requirement shall preclude the extension of the shields through the connector or past the terminal strip to individual circuits or chassis if required to minimize unwanted coupling inside the equipment. Where extensions of this type are necessary, overall cable or bundle shields grounded in accordance with this section shall be provided.

(3) Termination of Overall Shields. Cables that have an overall shield covering individually shielded pairs shall have the overall shield grounded at each end and at intermediate points in accordance with the following:

(a) Shields of cables terminated to connectors shall be bonded so that the securing clamp of the connector is tight enough to ensure that a low-resistance bond to the connector shell is achieved around the circumference of the cable shield. Prior to terminating the shield, the shield shall be carefully cleaned to remove dirt, moisture, and corrosion. The bonds shall be suitably protected against

weather, corrosive atmospheres, and mechanical damage. Under dry conditions, a corrosion preventive or sealant shall be applied within 24 hours after bonding. Under highly humid conditions, sealing of the bond shall be accomplished within 1 hour after bonding.

(b) Cables which penetrate walls or panels of cases or enclosures without the use of connectors shall have their shields bonded to the penetrated surface using a type 4 bond strap that encircles the cable shield and connects to the enclosure with the suitable bolted connector. Ensure that the shield is clean and that the strap is tightened securely to the shield to provide a good ground.

(c) Grounding of overall shields to terminal strips shall utilize a bonding halo or ferrule at the end of the overall shield which in turn is connected to a terminal on the strip with a No. 16 AWG or larger conductor whose length shall be 2 inches (5.1 centimeters (cm)) or less. The terminal on the strip will be firmly and suitably connected to the equipment case.

(d) Where the cable continuity is interrrupted, such as at a junction box, the shield shall be carried through and grounded at the box. The length of the unshielded conductors shall not exceed 1 inch (25 mm). To meet this requirement the length of the shield pigtail may be longer than 1 inch if necessary to reach ground but shall be kept to the minimum possible length.

c. Spatial Separation. The design and layout of facilities shall physically separate equipment and conductors which produce interference from equipment and conductors which are susceptible to interference. In general, equipment and conductors which carry, produce, or use high levels of current, voltage, or power, including pulse power, produce interference. Equipment and conductors which carry, produce, or receive low voltage or power levels are susceptible to interference.

d. Personnel Protection. All electrical wiring and equipment shall be installed in accordance with the NEC and specification FAA-C-1217d. The equipment shall be grounded as indicated in this section and in accordance with the NEC.

44. SPECIFIC DME GROUNDING DIRECTION. The overall DME grounding scheme shall consist of: a top-to-bottom No. 6 AWG bare copper wire ground bused to the ground block within the main power distribution panel, an insulated ac safety ground from the DME equipment rack convenience outlet to the adjacent rack or the circuit breaker, and an insulated ac safety ground from the DME equipment rack barrier strip to the power panel circuit breaker panel.

SECTION 4. INSTALLATION OF BATTERY PACK

45. GENERAL, BATTERY PACK (UNIT 3). This section contains information directly related to installation and interconnection of the battery pack to DME equipment at selected air navigation facilities. Information concerning unpacking, inspection, installation, and cable routing and connection is included. Checkout and adjustment procedures are included in chapter 6, DME Equipment Checkout.

46. UNPACKING AND REPACKING. (To be supplied.)

47. INSTALLATION OF BATTERY PACK FRAME. (To be supplied.)

48. INSTALLATION OF BATTERIES. (To be supplied.)

49. CABLE ROUTING AND CONNECTION. (To be supplied.)

50. BATTERY PACK GROUNDING. (To be supplied.)

SECTION 5. INSTALLATION OF THE RLSI

51. GENERAL, RLSI. This section contains information directly related to installation, integration, and checkout of the RLSI. Included is information concerning unpacking, inspection, installation/interconnection, and performance of checkout/adjustment procedures to verify proper operation within the control facility after installation.

52. UNPACKING AND REPACKING. RLSI units 4, 5, and 6 are shipped in one container. Table 5-4 lists the contents of the container and should be used to check the bill of materials and the actual shipments. Care should be taken in unpacking the equipment to avoid damage. It is recommended that packing for reshipment be accomplished by using the same container and cushioning fillers with which the equipment was originally packed. If these materials are not available, care should be taken to provide adequate cushioning and sturdy shipping containers as required by specification MIL-E-17555. After opening the shipping container and removing the cushioning fillers, perform the steps described in paragraphs 52a through c in sequence.

a. Check Equipment Supplied. Check the contents of the container (table 5-4) to ensure that the DME RLSI is complete. Figure 5-10 shows DME signal receiver (unit 4), remote indicator (unit 5), DME receiver antenna (unit 6), power cable, and system connectors.

b. Damaged Equipment. Examine the contents of the container for signs of shipping damage. Particularly check to see if the container shows signs of mishandling. If any equipment is found to be damaged, no attempt should be made to remove, install, or operate it. Inform the carrier as to the nature of the damage before returning the equipment to the factory.

TABLE 5-4. DME RLSI

Item	Quantity	FAA Type	Part Number
DME signal receiver (unit 4)	1	FA-9783	103149
Remote indicator (unit 5)	1	FA-9783	103305
DME receiver antenna (unit 6)	1		
Power cable	4 feet	-------	102900
Type N connector for RG-214/U antenna cable	2	-------	M39012/01-0005
Multipin connector for 7-conductor interconnecting cable between unit 4 and unit 5	1	-------	MS3116F14-12S

(To Be Supplied)

FIGURE 5-10. RLSI UNITS

c. Visual Inspection. After opening all the containers, removing all packing materials or interior restraints, and checking that no shipping damage has occurred, the DME RLSI units are ready to be moved onto a flat, clean surface for a thorough inspection.

(1) Remove all equipment from the shipping crate and place it on a clean, flat surface. Loosen the four captive screws securing the signal receiver (unit 4) to its case. Pull unit 4 out to the RLSI service position and carefully inspect it for damage to cables, connectors, and subassemblies. After inspection, push unit 4 fully back into the case and secure it to the case.

(2) Carefully inspect the RLSI receiver antenna (unit 6) for any damage to the radome or the connector. In addition, inspect remote indicator (unit 5), the power cable, and the system connectors for any visible damage.

53. RLSI EXTERNAL CABLING INTERCONNECTIONS.

a. Refer to tables 5-5 and 5-6 for the types of cables required (required but not supplied). Figure 5-11 shows the interconnection between the DME signal receiver (unit 4), remote indicator (unit 5), DME receiver antenna (unit 6), and primary power to form the RLSI cabling diagram.

b. Cable Assembly. Assemble the appropriate connectors on the appropriate cables as follows:

(1) Cut the RG-214/U antenna cable to the required length for the site involved and attach the type N connectors as shown in figure 5-5. Allow sufficient slack in the cable to permit the DME signal receiver unit to be easily extended to the service position in the rack.

(2) Cut and assemble the required seven-conductor, No. 24 AWG cable for connection between 4TB1 of unit 4 and J1 of unit 5. Attach the required spade lugs (to fit No. 6 screws) at one end of the cable; at the other end, attach the MS3106E-16-IOS connector as shown in figure 5-5. Be sure to allow enough slack in this cable so that the DME signal receiver unit can be easily pulled out to the full-service position.

54. INSTALLATION OF DME SIGNAL RECEIVER (UNIT 4). To install the DME signal receiver unit into an equipment rack, proceed as follows:

NOTE: The DME signal receiver unit is normally installed in an equipment rack but can be operated when resting on any clean, cleared bench surface or desk.

NOTE: Assumption is made in these installation procedures that clear access to the rear of the equipment rack is available or can be made available. If clear access cannot be provided, suitable modifications to these installation procedures should be made to permit proper connection of the cables to the appropriate connectors/terminal block at the rear of the unit 4 chassis.

TABLE 5-5. RLSI EQUIPMENT AND ACCESSORIES SUPPLIED

Quantity	Nomenclature	FAA Type
1	DME signal receiver, unit 4	FA-9783
1	Remote indicator, unit 5	FA-9783
1	DME receiver antenna, unit 6	FA-9783
1	4-foot power cable	
2	Type N male cable connector for RG-214/U cable	
1	Multipin connector for remote indicator, unit 5	

TABLE 5-6. RLSI CABLING AND ACCESSORIES REQUIRED BUT NOT SUPPLIED

Quantity	Item	Type/Description
1 length[1/]	Cable	RG-214/U for DME receiver antenna (unit 6)
1 length[1/]	Cable	7-conductor cable for connector to remote indicator (unit 5)
7	Spade lugs	Type to fit No. 6 screw and No. 24 AWG wire

[1/] Cable lengths differ for each installation and are to be determined at installation for each particular facility.

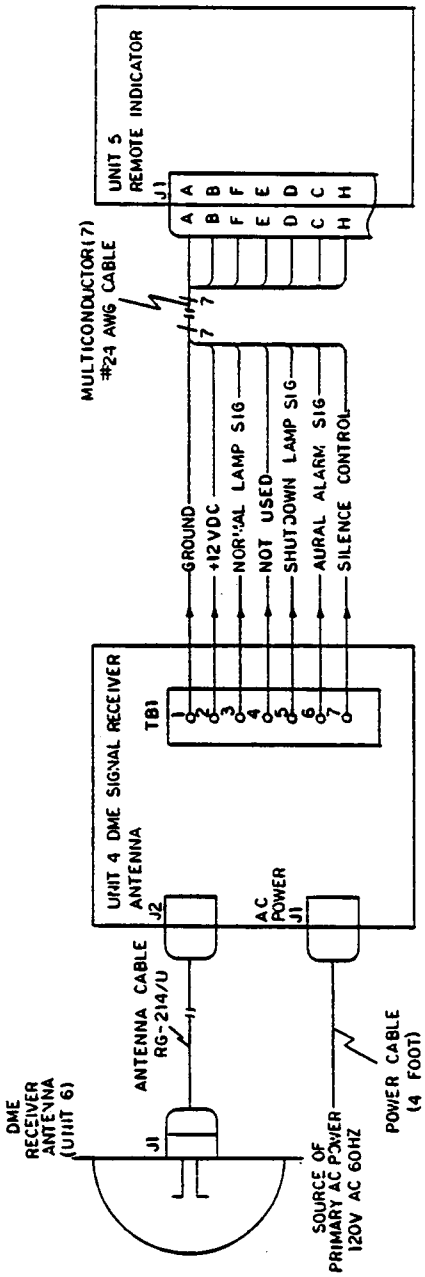


FIGURE 5-11. DME RLSI INTERCONNECTION DIAGRAM

a. Position the DME signal receiver unit (in the case) at the proper location in the equipment rack.

b. Secure the unit to the rack by means of four No. 10-32 1/2-inch screws at the case mounting flanges.

c. Connect the supplied power cable to the ac power connector 4J1 at the rear.

d. Connect the assembled antenna cable to the antenna connector 4J2 at the rear.

e. Connect the spade lugs of the assembled seven-conductor control cable between unit 4 and unit 5 to the proper terminals of terminal board 4TB1 at the rear of unit 4 in accordance with the system cabling diagram, figure 5-11.

f. This completes installation of unit 4 into the equipment rack.

55. INSTALLATION OF REMOTE INDICATOR (UNIT 5). To install the remote indicator unit into a console, proceed as follows:

NOTE: The remote indicator unit can be installed in a console or can rest on any clean, cleared bench surface or desk for operation.

a. Connect the assembled seven-conductor control cable between TB-1 of unit 4 and connector 5J1 on the rear panel of unit 5.

b. For console mounting, unfasten the four screws securing the rubber feet on the bottom of unit 5; remove and store these rubber feet.

c. Slide the remote indicator unit into its proper location within the console and secure the unit in position by using appropriate screws at the four mounting holes in the front panel.

d. This completes installation of unit 5 into a console.

56. INSTALLATION OF DME RECEIVER ANTENNA (UNIT 6). To install the DME receiver antenna unit on a 1 1/2-inch pipe, proceed as follows:

NOTE: The DME receiver antenna unit is normally installed on a 1 1/2-inch pipe. However, the antenna unit can be installed in some other suitable manner by first removing the securing brackets at the back of the antenna and then bolting the antenna in place facing the transmission antenna of the DME ground station equipment terminal area. Figure 5-12 shows a typical antenna installation.

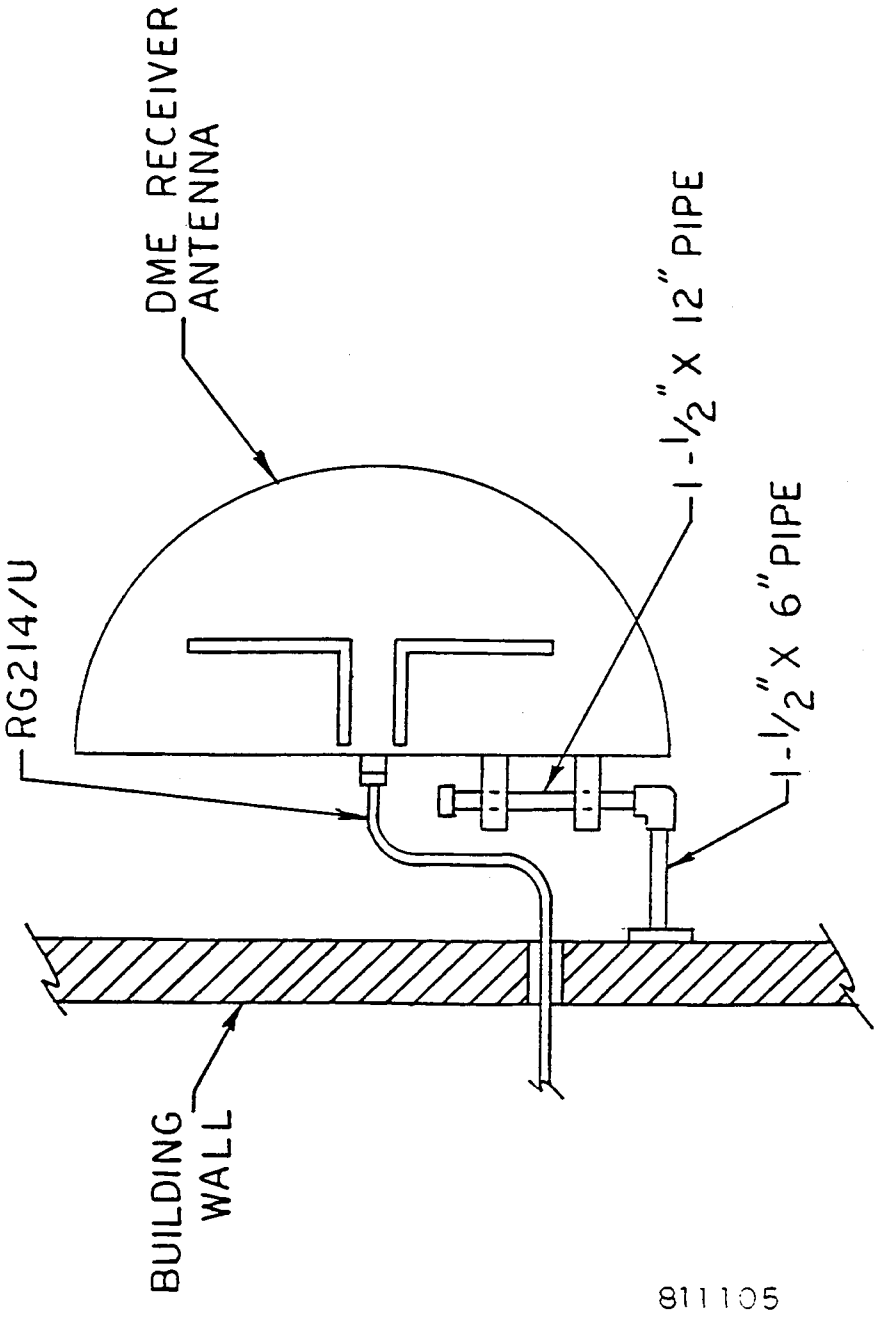


FIGURE 5-12. DME RECEIVER ANTENNA INSTALLATION

a. Loosen the two securing brackets on the back of the antenna and slide the antenna onto a 1 1/2-inch mounting pipe.

b. Orient the DME receiver antenna unit to face the transmission antenna of the DME ground station equipment terminal area.

c. Refasten the securing brackets to secure the DME receiver antenna unit firmly to the mounting pipe.

d. Connect the assembled antenna cable to the antenna connector at the rear of the antenna.

e. This completes installation of the DME receiver antenna unit on a mounting pipe.

57. RLSI POWER REQUIREMENTS. The input power to the DME is from a nominal 120-V ac, 60-Hz source. Variations within a range of 102 to 138 V ac, or 204 to 276 V ac, and 50 to 440 Hz are acceptable. Power supply 4A7 is factory wired for 120 V ac nominal. To change to 240 V ac, rewire transformer in 4A7 as shown in figure 5-13. Primary ac input current is approximately 0.5 ampere.

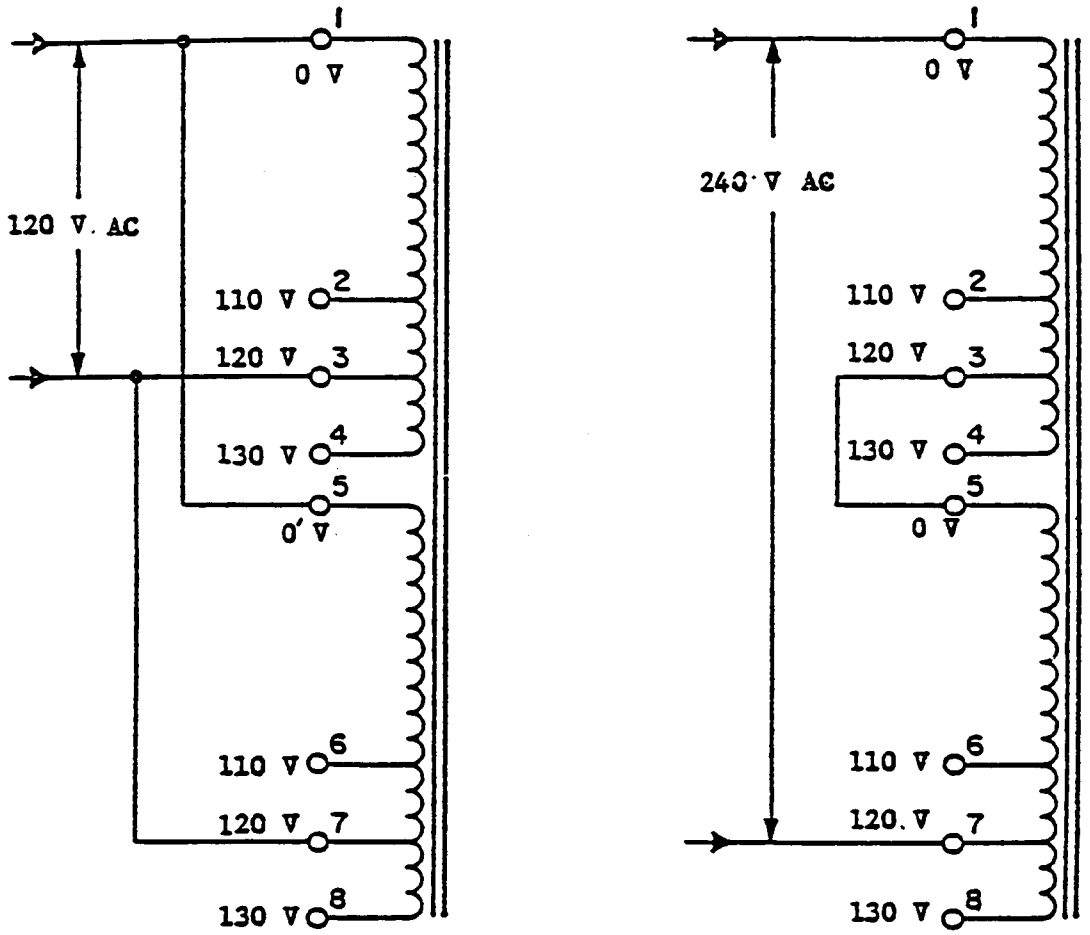
58. RLSI SYSTEM GROUNDING. System grounding is required in accordance with section 3 of this chapter.

SECTION 6. INSTALLATION, INTEGRATION, AND CHECKOUT OF THE RATR

59. GENERAL, RATR. This section contains information directly related to installation, integration, and checkout of the RATR. Included is information concerning unpacking, inspection, installation/interconnection, and performance of checkout/adjustment procedures to verify proper operation within the control facility after installation.

60. UNPACKING AND REPACKING RATR. The RATR (unit 7) is shipped in one container. Table 5-7 lists the contents of the container and should be used to check the bill of materials and the actual shipment. Care should be taken in unpacking the equipment to avoid damage. It is recommended that packing for reshipment be accomplished using the same container and cushioning fillers with which the equipment was originally packed. If these materials are not available, care should be taken to provide adequate cushioning and sturdy shipping containers as required by specification MIL-E-17555. After opening the shipping container and removing the cushioning fillers, perform the steps described in paragraphs 60a through c in sequence.

a. Check Equipment Supplied. Check the contents of the container (table 5-7) to ensure that the RATR system is complete. Figure 5-14 shows the RATR container contents.



A. FACTORY WIRING FOR 120 V AC

B. WIRING FOR 240 V AC

FIGURE 5-13. TRANSFORMER 4A7T1 WIRING FOR 120- OR 240-V AC OPERATION

TABLE 5-7. RATR EQUIPMENT AND ACCESSORIES SUPPLIED

Quantity	Nomenclature	FAA Type
1	RATR unit 7 contains: a. Printed circuit board 3A1 b. Power supply assembly 3A2	FA-9783
2	Instruction Book TI 6730.__	

(To Be Supplied)

FIGURE 5-14. RATR UNITS

b. Damaged Equipment. Examine the contents of the container for signs of shipping damage. Particularly check to see if the container shows signs of mishandling. If any equipment is found to be damaged, no attempt should be made to remove, install, or operate it. Inform the carrier as to the nature of the damage before returning the equipment to the factory.

c. Visual Inspection. After opening all the containers, removing all packing materials or internal restraints, and checking that no shipping damage has occurred, remove the RATR unit from the shipping crate and place it on a clean, flat surface. Loosen the two captive screws that secure the front panel door of the RATR and open the door to the service position. Carefully inspect unit 7 for damage to cables, connectors and subassemblies. After inspection, close the service door and tighten the captive screws to secure the door.

61. RATR EXTERNAL CABLING INTERCONNECTIONS. Figure 5-15 shows interconnections between the DME RATR and the DME type FA-9783. Also shown are the connection for primary power and interconnections to a remote indicator (not supplied). Cabling and accessories required but not supplied are listed in table 5-8.

62. INSTALLATION OF THE DME RATR (UNIT 7). To install the DME RATR unit into an equipment rack, proceed as follows:

NOTE: The DME RATR is normally installed in an equipment rack, but can be operated when resting on any clean, cleared bench surface or desk.

NOTE: Assumption is made in this installation procedure that clear access to the rear of the equipment rack is available or can be made available. If clear access cannot be provided, suitable modification to these installation procedures should be made to permit proper connection of the cables to the appropriate connector/terminal block at the rear of the unit.

a. Position the RATR (in the case) at the proper location in the equipment rack.

b. Secure the RATR to the rack by means of four No. 10-32, 1/2-inch screws at the mounting flanges.

c. Connect the power cable to the ac power connection 3J1 at the rear of the unit.

63. RATR POWER REQUIREMENTS. The input power to the RATR is from a nomimal 120-V ac, 60-Hz source. Variation within a range of 102 to 138 V ac, or 240 to 276 V ac, and 50 to 440 Hz are acceptable. Power supply 3A2 is factory wired for 120 V ac nominal. To change to 240 V ac, rewire transformer in 3A2 as shown in figure 5-13.

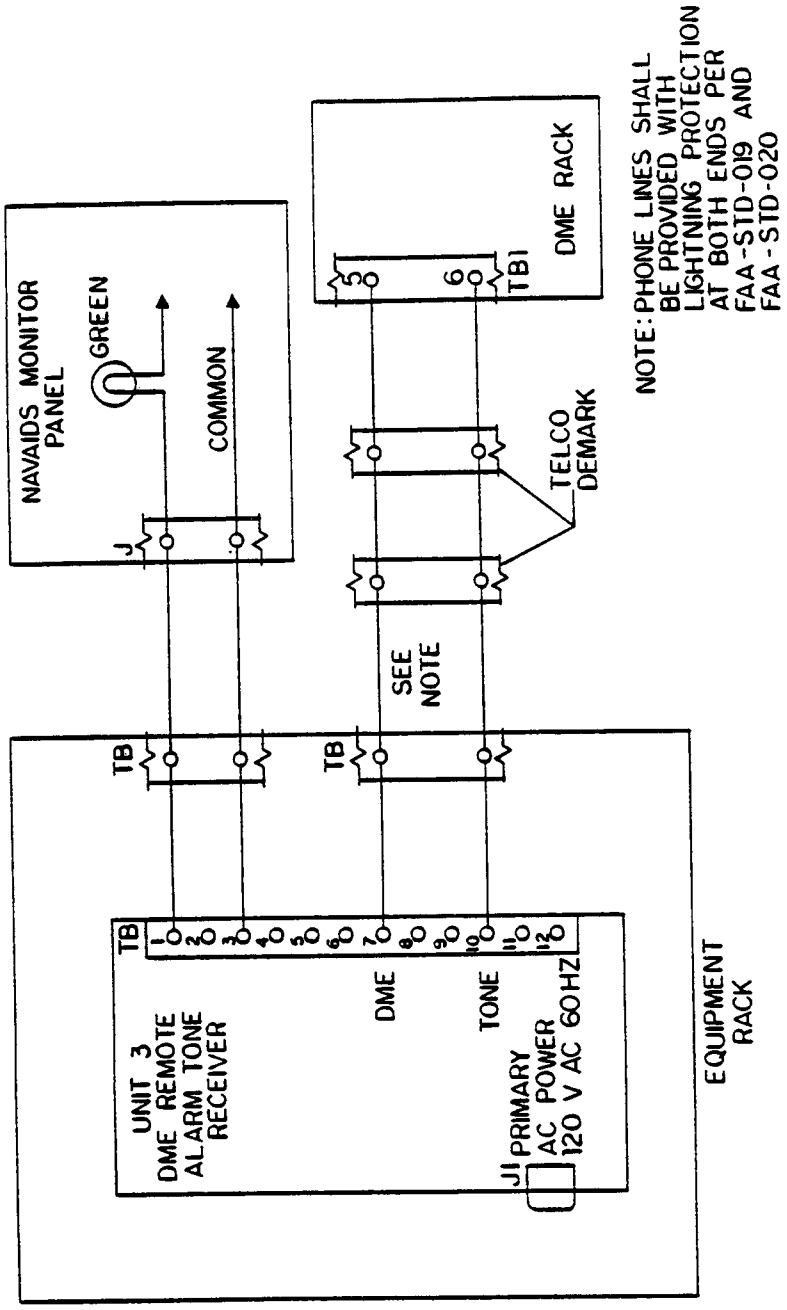


FIGURE 5-15. DME RATR INTERCONNECTION DIAGRAM

TABLE 5-8. RATR CABLING AND ACCESSORIES REQUIRED BUT NOT SUPPLIED

Quantity	Item	Type/Description
1	Power cord[1/]	
1 length	Cable	2-conductor telephone line
1 length	Cable	No. 22 AWG wire shielded, twisted pair
	Insulated spade lugs	Type to fit No. 6 screw and No. 22 AWG wire
	Insulated spade lugs	Type to fit No. 6 screw and No. 24 AWG wire

[1/] Cable lengths differ for each installation and are to be determined at installation for each particular facility.

64. RATR SYSTEM GROUNDING. System grounding is required in accordance with section 3 of this chapter.

65. RESERVED.

CHAPTER 6. DME EQUIPMENT CHECKOUT

66. INSPECTION AND PRE-ENERGIZING PROCEDURES. Perform the following steps before applying power to the equipment:

a. Inspect equipment rack (unit 1) and verify that all assemblies are installed in the correct location and are properly oriented.

b. Inspect all unit 1 interconnecting cables and verify that they are installed in accordance with figure 5-3 and that continuity exists in all interconnections shown.

c. Inspect connections to antenna (unit 2) for security and verify that the obstruction lights (if used) illuminate when power is applied.

d. Ensure that the test equipment is properly calibrated and the degrees of accuracy and calibration dates properly recorded.

e. Ensure that unit 1 has been installed to allow adequate access to the rear of the equipment as well as sufficient room in front of the unit to permit servicing of the assembly with drawers in the fully extended position.

f. Ensure that unit 1 is installed in a position to permit adequate ventilation for the power supplies.

67. STARTUP AND PRELIMINARY TEST. Perform the following procedures to determine that the primary ac power circuits and the backup dc battery power circuits are operating within limits:

a. On unit 1, set all system circuit breakers to OFF.

b. Using the ac voltmeter, measure ac line voltage between 1TB2-8 and 1TB2-9. Voltage measured should be 120 V ac.

c. On assembly 1A4, set the AC POWER circuit breaker to ON.

d. Using the voltohmmeter, measure dc power supply voltage at (-) and (+) VOLTAGE 21-42 V dc test points. Voltage measured should be 28 V dc (up to 30 V dc).

e. Set BATTERY circuit breaker to ON.

f. Repeat step d and verify that no change occurs in dc power supply voltage.

g. Using the voltohmmeter, measure voltage across the battery terminals. Voltage measured should be 28 V dc (up to 30 V dc) .

h. Set BATTERY circuit breaker to OFF.

i. Set DC MAIN POWER circuit breaker to ON.

j. Repeat step d and verify that no change occurs in dc power supply voltage.

k. Using the voltohmmeter, measure dc current at (-) and (+) CURRENT MV/A test points for 0 ±1 milliampere (mA).

l. On assembly 1A1, set POWER circuit breaker to ON.

m. Using voltohmmeter, verify the presence of all dc voltages at the 1A1 front panel test points.

68. INSTALLATION VERIFICATION TEST. To verify proper operation of the DME, it is only required that the performance test given in section 6 of the equipment instruction book be performed.

69.-70. RESERVED.

CHAPTER 7. DEFINITIONS AND GLOSSARY OF TERMS

71. ABBREVIATIONS, ACRONYMS, AND INITIALISMS

A	ampere
ac	alternating current
AF	Airway Facilities
AWG	American Wire Gage
cm	centimeter
CO	contracting officer
dB	decibel
^{o}C	degree Celsius
dc	direct current
DME	distance measuring equipment
FAA	Federal Aviation Administration
Hz	hertz
ICAO	International Civil Aviation Organization
ILS	instrument landing system
i/ot	input/output terminal
LED	light-emitting diode
los	line-of-sight
mA	milliampere
mm	millimeter
NEC	National Electrical Code
navaid	navigational aid
pcb	printed circuit board
pvc	polyvinyl chloride
RATR	remote alarm tone receiver
rf	radio frequency
RLSI	radio link status indicator
TACAN	tactical air navigation
UL	Underwriter's Laboratories, Inc.
V	volt
vhf	very high frequency
VOR	very high frequency omnidirectional radio range
W	watt

APPENDIX 1. FAA FORM 198 (DME)

RECORD OF METER READINGS AND ADJUSTMENTS

FEDERAL AVIATION ADMINISTRATION

FAA Form 198 (DME)

STATION _____

DATE _____

REV. NO. _____

RECORD OF METER READINGS AND ADJUSTMENTS

INSTRUCTIONS

When the facility is originally commissioned, a complete FAA Form 198 for distance measuring equipment (DME) will be prepared jointly by installation personnel and the sector manager or his representative. Use of the word "original" on the line marked "rev. no." in the heading above will indicate that no previous record of adjustments has been prepared. When an entry is not applicable to a particular DME system, "N/A" shall be entered in the appropriate space.

Following facility modification or a retuning of the facility which results in significant deviations from the data recorded herein, page 1 and other applicable pages will be revised in duplicate - one copy for the facility and one for the sector office.

The following sheets of FAA Form 198 (DME) are being prepared as of the above original or revision date:_____. Changes have not been made affecting any of the data on pages not listed above.

Reason for making revisions:_____
_____
_____

Date of last flight check: _____

Comments by flight or technical personnel: _____

_____

_____

_____
For Installation Title

_____
For Facility Title

Copies:
Facility (original)
Sector Office
Regional Office

FAA Form 198 (DME)
STATION _____
DATE _____
REV. NO. _____

COMMISSIONING DATA
DME GROUND SYSTEM
TYPE FA-9783

Station Ident. _____ Channel No. _____

Transmitter Freq. _____ Receiver Freq. _____

Type Facility Used With _____ Monitoring Category _____

Original Commissioning Date _____

1/ Geographic Location of Facility _____

_____

Latitude _____ Longitude _____

Magnetic Declination _____ Elevation _____

Controlling Region _____ Controlling FSS _____

Monitoring Category _____

1/ Geographic location at ground station building should be briefly described with reference to a prominent landmark such as a city or airport.

Example: 4.6 miles north of Eastern Airport.

DME

PARAMETER	REFERENCE	TOLERANCE	DATA	DATA
a. Transponder				
(1) Transmitter				
(a) Frequency	Assigned frequency	Within 0.002 percent of assigned frequency	____	____
(b) Peak power				
100 W version	100 W	Not less than 100 W	____	____
1000 W version	1000 W	Not less than 1000 W	____	____
(c) Reply pulse characteristics				
1 Pulse width	3.5 µs	3.0 to 4.0 µs	____	____
2 Pulse rise time	2.5 µs	1.5 to 3.0 µs	____	____
3 Pulse decay time	2.5 µs	1.5 to 3.0 µs	____	____
4 Pulse pair spacing	12.0 µs(x) 30.0 µs(y)	11.75 to 12.25 µs 29.75 to 30.25 µs	____ ____	____ ____
(d) Output pulse count				
1 No interrogation	2700 pulses per second	2550 to 2850 pulses per second	____	____
2 Continuous tone (ident)	2700 pulse pairs per second	2680 to 2720 pulses per second	____	____
(2) Receiver				
(a) On-channel sensitivity	-90 dBm	-90 dBm	____	____
(b) Frequency response				
1 Sensitivity at ±200 Hz on channel	-90 dBm on-channel sensitivity	Within 3 dB of on-channel sensitivity	____	____

PARAMETER	REFERENCE	TOLERANCE	DATA	DATA
2 Reply count at ±900 kHz	No replies	10	____	____
(3) Decoder-encoder				
(a) Decoder acceptance	12 μs(x) 36 μs(y)	11.5 to 12.5 μs 35.5 to 36.5 μs	____	____
(b) Identification group pulse pair spacing (equalizing pulses)	100 μs	90 to 100 μs	____	____
(c) Identification tone frequency	1350 Hz	1340 to 1360 Hz	____	____
(d) Reply delay				
1 x	50 μs	49.85 to 50.15 μs	____	____
2 y	56 μs	55.85 to 56.15 μs	____	____
b. Signal monitor alarm points				
(1) Peak power monitor	52.5 W	50 to 55 W	____	____
(2) pulse-repetition frequency (PRF) monitor output pulse	850 pulse pairs/sec	±100 pulse pairs/sec	____	____
(3) Reply efficiency monitor	850 pulse pairs/sec	±100 pulse pairs/sec	____	____
(4) Reply delay monitor				
(a) Lower limit	Established value -0.4 μs	-0.3 to -0.5 μs	____	____
(b) Upper limit	Established value +0.4 μs	+0.3 to +0.5 μs	____	____
(5) Pulse pair spacing monitor				
(a) Lower limit	Established value -0.4 μs	-0.3 to -0.5 μs	____	____
(b) Upper limit	Established value +0.4 μs	+0.3 to +0.5 μs	____	____

PARAMETER	REFERENCE	TOLERANCE	DATA	DATA
(6) Identification monitor				
(a) Loss of identification	75 s	65 to 85 s	____	____
(b) Continuous tone	7 s	4 to 10 s	____	____
c. Monitor shutdown delay				
(1) All monitor alarms	7 s	adj ±1 s	____	____
(2) Monitor alarm amplifier delay	7 s	adj ±1 s	____	____
d. Interrogation signal generator				
(1) Normal monitoring output level	-79 dBm	-79 dBm	____	____
(2) Interrogation pulses				
(a) Spacing	12 μs(x) 36 μs(y)	11.8 to 12.2 μs 35.8 to 36.2 μs	____ ____	____ ____
(b) Width	3.5 μs	3.0 to 4.0 μs	____	____
(c) Rise time	0.1 μs	±0.1 μs	____	____
(d) Decay time	0.1 μs	±0.1 μs	____	____
(e) Output level over ± 900 kHz band	Equals indication	Within 5 percent of maximum indication	____	____
(3) Continuous wave rf output				
(a) Level	Equals indication	Within 1.0 dB of indication	____	____
(b) Frequency				
1 On channel ±200 kHz	Marked frequency	Within 0.002 percent of standard	____	____
2 ±900 kHz	Marked frequency	Within 0.005 percent of standard	____	____

PARAMETER	REFERENCE	TOLERANCE	DATA	DA
e. Miscellaneous				
(1) Tone oscillator				
(a) Frequency				
1 No. 1	2820 Hz	2819 to 2821 Hz	____	____
2 No. 2	2940 Hz	2939 to 2941 Hz	____	____
(b) Output level stability (at demarc strip)	-12 dBm	-12 to -13 dBm	____	____
(2) RF cable leakage resistance	No leakage megohms	20 megohms	____	____

APPENDIX 2. FAA FORM 198 (RATR)

RECORD OF METER READINGS AND ADJUSTMENTS

FEDERAL AVIATION ADMINISTRATION

FAA Form 198 (RATR)

STATION _____

DATE _____

REV. NO. _____

RECORD OF METER READINGS AND ADJUSTMENTS

INSTRUCTIONS

When the facility is originally commissioned, a complete FAA Form 198 (RATR) will be prepared jointly by installation personnel and the sector manager or his representative. Use of the word "original" on the line marked "rev. no." in the heading above will indicate that no previous record of adjustments has been prepared. When an entry is not applicable to a particular DME system, "N/A" shall be entered in the appropriate space.

Following facility modification or a retuning of the facility which results in significant deviations from the data recorded herein, page 1 and other applicable pages will be revised in duplicate - one copy for the facility and one for the sector office.

The following sheets of FAA Form 198 (RATR)_____, remote alarm tone receiver, are being prepared as of the above original or revision date:_____. Changes have not been made affecting any of the data on pages not listed above.

Reason for making revisions:_____
_____
_____

Date of last flight check: _____

Comments by flight or technical personnel: _____

_____

_____

_____
For Installation Title

_____
For Facility Title

Copies:
Facility (original)
Sector Office
Regional Office

FAA Form 198 (RATR)

STATION _____

DATE _____

REV. NO. _____

COMMISSIONING DATA
DME GROUND SYSTEM
TYPE FA-9783

Station Ident. _____ Channel No. _____

Transmitter Freq. _____ Receiver Freq. _____

Type Facility Used With _____ Monitoring Category _____

Original Commissioning Date _____

1/ Geographic Location of Facility _____

_____

Latitude _____ Longitude _____

Magnetic Declination _____ Elevation _____

Controlling Region _____ Controlling FSS _____

Monitoring Category _____

1/ Geographic location at ground station building should be briefly described with reference to a prominent landmark such as a city or airport.

Example: 4.6 miles north of Eastern Airport.

RATR

PARAMETER	REFERENCE	TOLERANCE	DATA	DATA
AM Receiver Threshold				
2820 Hz	2820 Hz	±15 Hz	____	____
2940 Hz	2940 Hz	±15 Hz	____	____
Alarm Time Delay	7 s	6 to 8 s	____	____

APPENDIX 3. FAA FORM 198 (RLSI)

RECORD OF METER READINGS AND ADJUSTMENTS

FEDERAL AVIATION ADMINISTRATION

FAA Form 198 (RLSI)

STATION _____

DATE _____

REV. NO. _____

RECORD OF METER READINGS AND ADJUSTMENTS

INSTRUCTIONS

When the facility is originally commissioned, a complete FAA Form 198 (RLSI) will be prepared jointly by installation personnel and the sector manager or his representative. Use of the word "original" on the line marked "rev. no." in the heading above will indicate that no previous record of adjustments has been prepared. When an entry is not applicable to a particular DME system, "N/A" shall be entered in the appropriate space.

Following facility modification or a retuning of the facility which results in significant deviations from the data recorded herein, page 1 and other applicable pages will be revised in duplicate - one copy for the facility and one for the sector office.

The following sheets of FAA Form 198 (RLSI)_____, radio link status indicator, are being prepared as of the above original or revision date:_____. Changes have not been made affecting any of the data on pages not listed above.

Reason for making revisions:_____
_____
_____

Date of last flight check: _____

Comments by flight or technical personnel: _____

_____

_____

_____
For Installation Title

_____
For Facility Title

Copies:
Facility (original)
Sector Office
Regional Office

FAA Form 198 (RLSI)
STATION _____
DATE _____
REV. NO._____

COMMISSIONING DATA
DME GROUND SYSTEM
TYPE FA-9783

Station Ident. _____ Channel No. _____

Transmitter Freq. _____ Receiver Freq. _____

Type Facility Used With _____ Monitoring Category _____

Original Commissioning Date _____

1/ Geographic Location of Facility _____

_____

Latitude _____ Longitude _____

Magnetic Declination _____ Elevation _____

Controlling Region _____ Controlling FSS _____

Monitoring Category _____

1/ Geographic location at ground station building should be briefly described with reference to a prominent landmark such as a city or airport.

Example: 4.6 miles north of Eastern Airport.

RLSI

PARAMETER	REFERENCE	TOLERANCE	DATA	DATA
Receiver Threshold	12 μV (-85 dBm)	±0.5 μV	____	____
Alarm Delay	25 seconds	±0.5 second	____	____

U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

DATE:

IN REPLY
REFER TO:

SUBJECT:

FROM:

TO: Chief, Navaids/Communications Engineering Division, AAF-400

Problems with Present ISH.

Recommended Improvements.

U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

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